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General Intelligence, Term of Stay and Trade Selected—Trade-School Students

*Max S. Henig**

THIS is an account of an investigation into the relation of general intelligence to the term of stay of over 700 boys who constituted the enrollment of a trade school between the months of February, 1926, when this school was first opened, and January, 1929. During this period, 495 boys left school. It is possible, and this study recognized this possibility, that a goodly number of these boys undoubtedly had become dissatisfied with the situation in which they found themselves, for they had entered by transfer from other well-established vocational schools or from nieghboring academic schools. A boy, moreover, may enroll at this school at any time a vacancy exists. It follows that at the time set for the termination of this study, some pupils had but recently entered, while others were on the verge of leaving. To discover the effect of both these conditions, a study was also made of a group of 88 boys who had entered between the months of February and July, inclusive, during 1926; and, since the school was giving what amounted to a three-year course, had therefore had the time at the terminal date of this study, either to have left or to have graduated. Allowing for the comparatively small number of cases involved, the data consequently give a complete account of the relationship between the general intelligence of the boys entered at this school and their term of stay.

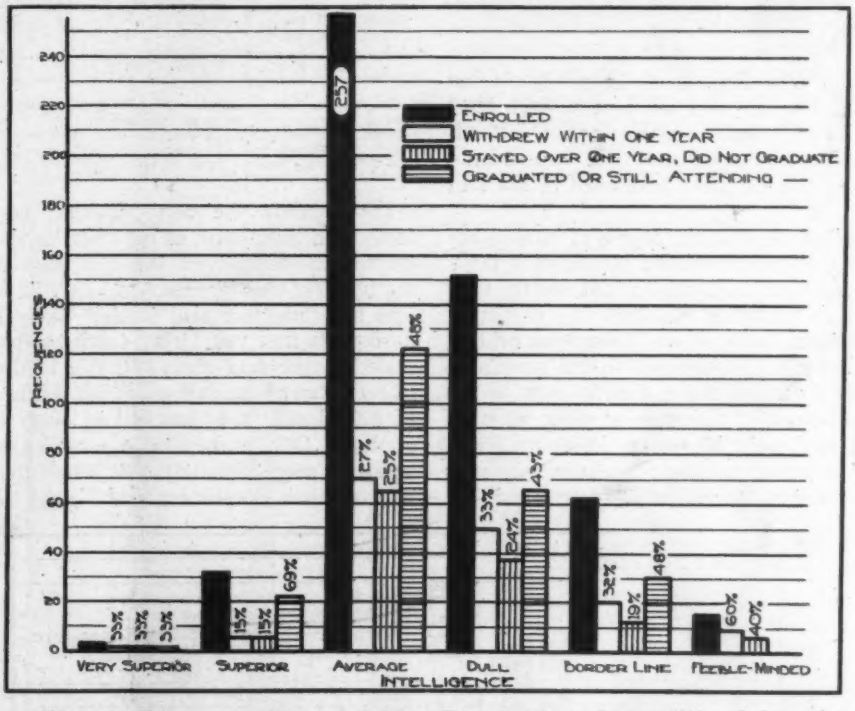

FIG. 1. Intelligence grades of boys enrolled from February, 1926, to January, 1929, and the number and per cent of each intelligence grade (1) leaving before the completion of a year's attendance, (2) staying more than a year but not long enough to graduate, and (3) having graduated or still attending.

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The study is entirely statistical in nature. Of the 736 boys enrolled in the school, the I. Q's for 521 had been determined by means of the Terman Group Test of Mental Ability. From among this number, 281 left during the term covered by this study. The term of stay for each boy was learned by reference to the attendance records. Table I and Figure 1 show the distribution of these boys according to intelligence levels and according to the number and per cent in each level who (1) left school without completing a year's attendance, (2) attended a year or more but who did not stay to graduate, and (3) have graduated or are still attending.

TABLE I

Intelligence Grade	Number	Did Not Stay One Year	Per Cent	Stayed One Year, Didn't Graduate	Per Cent	Graduated or Attending	Per Cent
Very Superior	3	1	33.0	1	33.0	1	33.0
Superior	32	5	15.6	5	15.6	22	68.8
Average	257	70	27.2	65	25.3	122	47.4
Dull	152	50	32.9	37	24.3	65	42.8
Border Line	62	20	32.3	12	19.3	30	48.4
Feeble-minded	15	9	60.0	6	40.0		
Totals	521	155	29.8	126	24.2	240	46.1

Distribution according to intelligence grades of boys enrolled from February, 1926, to January, 1929, and the number and per cent in each intelligence level (1) leaving before the completion of a year's attendance, (2) staying more than a year but not long enough to graduate, and (3) having graduated or still attending. All per cents based on total enrolled in each intelligence grade.

According to these figures, the degree of intelligence had very little influence upon the length of a boy's stay. Disregarding both the feeble-minded and the very superior groups as including too few cases to permit any valid conclusions to be drawn, it becomes evident that the percentage of withdrawals in the remaining classifications is about the same, slightly over 50 per cent, except in the case of the superior group where it totals only 31 per cent. Moreover, in every group except the average or normal, the per cent withdrawing during the first year is only slightly greater than that withdrawing during the remainder of the course, except in the border-line group, where the difference is 13 per cent. It appears that the term of a boy's attendance was only slightly related to the degree of his intelligence; but that those of superior intelligence were more likely to stay a longer term, and that those in the border-line group were more likely to withdraw during the first year, than the others.

Table II and Figure 2 give the corresponding data for the group of 88 boys, who, having enrolled between the months of February to June, inclusive, during 1926, had the opportunity during the interim covered by this study to complete their course and graduate. This group, though somewhat small for the purpose, may therefore be considered as a check in seeking to determine to what extent the degree of intelligence of apprentices in this school is related to their term of stay.

TABLE II

Intelligence Grade	Number	Stayed Less than One Year	Per Cent	Stayed Over One Year, Did Not Graduate	Per Cent	Graduated	Per Cent
Very Superior	1			1	100.0		
Superior	7	1	14.2	3	42.8	3	42.8
Normal	47	7	14.9	24	51.1	16	34.0
Dull	26	7	26.9	14	53.8	5	19.2
Border Line	6	1	16.7	2	33.3	3	50.0
Feeble-minded	1			1	100.0		
Totals	88	16	18.2	45	51.1	27	30.7

Distribution of apprentices according to general intelligence and the number and per cent in each intelligence level (1) leaving before the expiration of one year, (2) staying more than one year but not completing the course, and (3) graduating. All per cents based on total in each intelligence group. Boys enrolled during February to June, inclusive, 1926.

Disregarding the very superior, border-line, and feeble-minded groups, as may well be done because of the few cases involved, the data show definitely that the brighter the boy, the less likely he is to leave before he graduates; also the less likely he is to leave during his first year. This confirms the situation revealed by the data given in Table I. Almost three out of every ten of the dull group left during the first year of attendance; only one out of every five stayed to graduate. Of the average or normal group, only half as many, proportionately, left before the first anniversary of their enrollment and almost twice as many stayed to graduate. It would appear then, that in general, the more intelligent the boy, the more likely he was to stay for more than a year and the greater his chance of staying till he graduated.

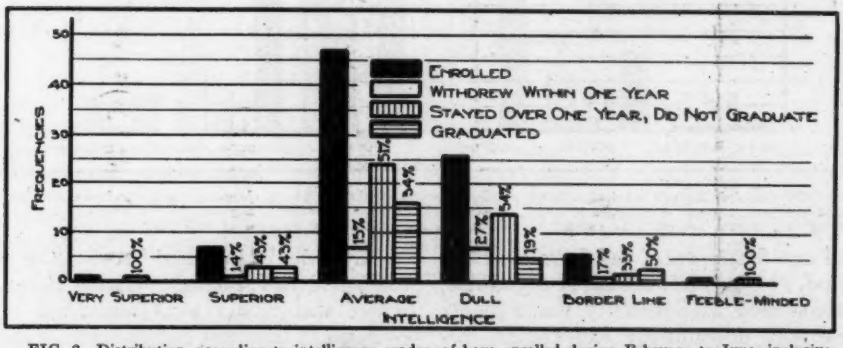

FIG. 2. Distribution, according to intelligence grades, of boys enrolled during February to June, inclusive, 1926, and the number and per cent in each grade (1) leaving before the expiration of one year, (2) staying more than one year but not completing the course, and (3) graduating.

An outstanding difference between this three-year check group and that constituting the general enroll-

ment is that a much smaller per cent of the former left during the first year's attendance than during the remainder of the course, the ratio being about 1 to 3, whereas with the total enrollment group, this ratio was practically 1 to 1. The difference in all probability is not significant, being due, as has been remarked, to the fact that the general-enrollment group included many who left soon after the opening of school because they became dissatisfied with conditions as they found them.

Trade Selected and Relation to Intelligence and Term of Stay

The data has been assembled in such a manner as to make possible also an inquiry into the relation of the degree of intelligence of the boys who withdrew from school to their term of stay by the trades they had selected. This phase of the inquiry concerned itself only with the comparison, for those who left, of the per cent in each trade having an I.Q. of less than 90, that is, those below average in general intelligence, with those having an I.Q. of 90 and over, those of average and above average intelligence. The information is presented by both Table III and Figure 3.

Comparing the per cent of the below-average-intelligence group who left to those including in the normal-and-above group, shows for the former, that 25.7 per cent left, of the latter, 28.2 per cent. This is too small a difference to permit any inferences to be drawn. A trade-by-trade study of these two groups does reveal,

TABLE III

Department	Enrolled	Left School, Below Average Intelligence	Per Cent	Left School, Average & Above in Intelligence	Per Cent
Autorepair	121	42	34.7	32	26.4
Carpentry	92	29	31.5	24	26.1
Drafting	70	13	18.6	15	21.4
Electrical	105	19	18.1	38	36.2
Machine	41	10	24.4	11	26.8
Printing	92	21	22.8	27	29.3
Totals	521	134	25.7	147	28.2

Distribution of apprentices according to trade, giving the number and per cent of those below average in general intelligence, and those of average and above average intelligence, to leave. All per cents based on total enrolled in each trade department.

than 30 per cent of this classification failing to stay till graduation while only 26 per cent of the average and above-average in intelligence failed to stay. The opposite condition exists in the electrical and printshops, where the underendowed in general intelligence evidently find conditions much more congenial since only 18 per cent of this group withdrew from the former shop and 23 per cent from the latter. In the case of the better-endowed groups, 36 per cent did not stay

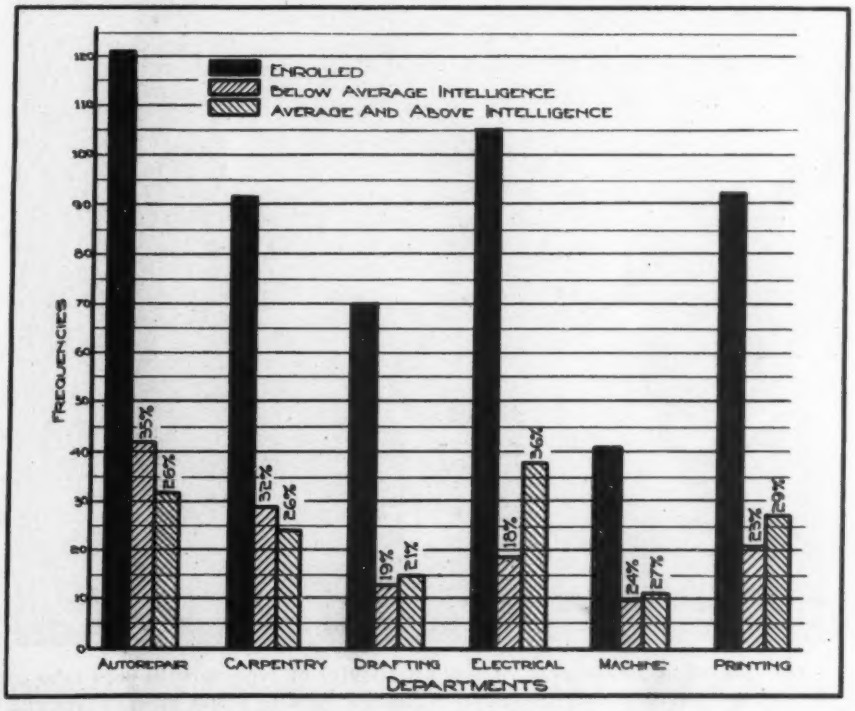

FIG. 3. Distribution of apprentices according to trades, showing also the number and per cent in each trade of the below-average in general intelligence to leave, and those of the average and those above average to leave.

however, some interesting and possibly significant differences. The below-average in general intelligence group shows comparatively little ability to hold on in the auto repair and the carpentry departments, more for graduation in the electrical department, 29 per cent withdrew from the printshop. Whether or not these differences are important remains a question that appears to merit further investigation.

Illustrative Material for the Printing Instructor

*R. Randolph Karch**

CHARTS and pictures pertaining to printing are a great aid in instruction. For very little expense, quite a large selection may be collected and put to profitable use in the school shop.

Some time ago, the Education Department of the American Type Founders Company, 300 Communipaw Avenue, Jersey City, New Jersey, prepared a series of 24 charts for use in teaching printing. The pictures are printed on 10-ply cardboard suitable for framing. In this lot the following aids appear in illustrated form: the layout of the California job case, the nomenclature of a piece of printing type, how to measure with a line gauge, how to hold the composing stick, how to test a line for justification, spaces used in setting type, characters difficult to distinguish, how to read composed type, standard proofreading marks, how to empty a stickful of type, how to hold type for distribution, lining type with a rule, faces of type and basic designs, different kinds of indentions, how to piece short leads, how to set type in small measures, the proper way to place type in the stick, picking up a line to replace in a stick for correction, how to tie up pages of type, how to fasten the page cord, locking up a single-page form, locking up a double-page form, setting guides and fenders, and breaking up a form for color. Hung at

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eye height, these charts have been found most helpful to both pupil and instructor.

The Mergenthaler Linotype Company, 29 Ryerson Street, Brooklyn, New York, furnished several valuable instructional aids gratis to the writer last year. They consist of the following: A group of sheets 19 by 25 in. printed in two colors, of classic type faces: Caslon Old Face, Cloister, Bodoni Book, Garamond, and Benedictine Book. These are invaluable in teaching difference found in type faces. Included in this list is a view of line-casting machine showing the path of the matrices through the machine. With this two-color chart the principles of the circulating matrix is easily explained. A view of the new Model 26 Linotype is also available. A facsimile illustration of a linotype keyboard may be purchased from the Inland Printer Company, 632 Sherman Street, Chicago, Illinois.

One of the most useful displays for use in teaching papermaking is issued by the Hammermill Paper Company, Erie, Pennsylvania. This display consists of a 55 by 16-in. illustration in color of a Fourdrinier papermaking machine, showing the path of the pulp through the machine to the finished paper. Each section of the machine is labeled and its work explained. With this picture come four tubes containing the paper pulp in various stages of manufacture. Other prints are available showing chipping, the digesters, the rifflers, and so on.

The Education Department of the International Typographical Union, Typographical Terrace, Indianapolis, Indiana, issued some time ago sheets 12 by 18 in. in size, illustrating lessons on the contrast in sizes of type, contrast in length of lines, margins and the value of white space, type harmony, the objection to condensed letters, and the objections to pyramidal effects. These sheets are of extraordinary value in the teaching of advanced composition.

The press manufacturers are very willing to coöperate with the printing instructor in furnishing large lithographs of their products. The Chandler & Price Company, Cleveland, Ohio, issues a print 18 by 22 in., showing a platen jobber and naming its important parts. The manufacturers of the Kelly Cylinders and the Lee Cylinder presses also furnish large prints of these presses.

Interesting as well as instructive prints may be picked up from time to time in trade journals, advertising circulars, and broadsides. In the past several years the writer has gathered and framed four-color prints of Benjamin Franklin, Johann Gutenberg, and a reproduction of an illuminated page from the famous Gutenberg Bible. The last mentioned was clipped from an advertisement of a popular encyclopedia. All are about 9 by 12 in., a size easy to frame.

The accompanying illustrations, shows the practical use of these many instructional aids in teaching printing. Most of the frames were made by the woodworking department of the school. The expense was thus cut to a minimum in preserving these invaluable helpers indefinitely.

THE AUTHOR'S UPHOLSTERY CLASS

Planning and Equipping the School Upholstering Shop

*Herbert Bast**

UPHOLSTERING work is being introduced in various schools as a separate course or in connection with cabinetmaking. Various colleges also are adding this course to their curriculum, especially during the summer sessions to prepare the woodworking instructors so they can add upholstering problems to their furniture projects.

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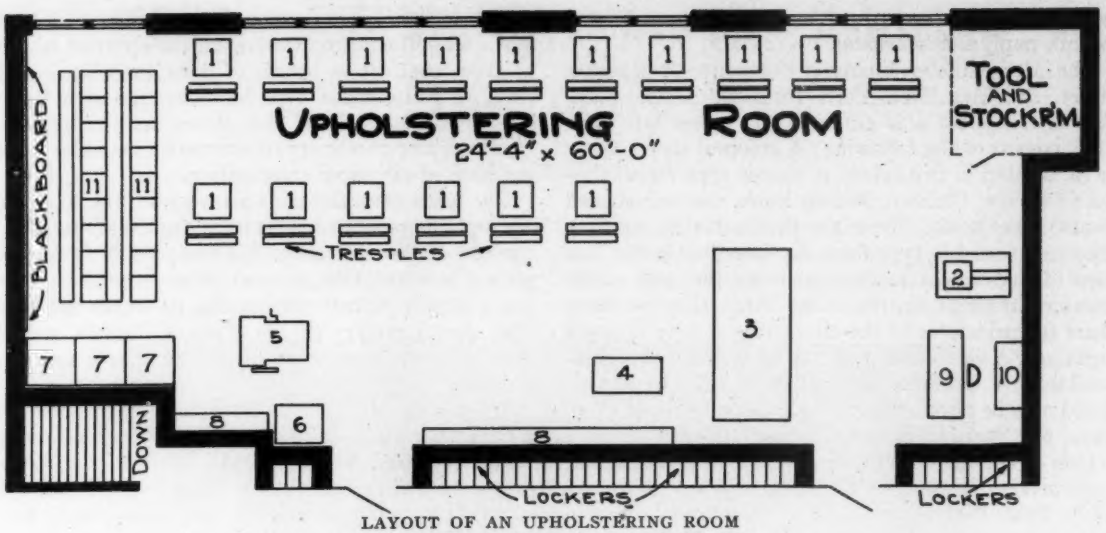
The greatest problem confronting the instructor in this type of work, is the selecting of the right kind of job for the beginner. It is not necessary to start out with large overstuffed chairs or davenports, because the kind of processes that the instructor wants to teach can be embodied in the upholstery required on stools, odd chairs, bedroom chairs, etc. In this way the student may acquire skill in the production of a



LAYOUT OF AN UPHOLSTERING ROOM

1. Workbench with Trestles
2. Cushion-Filling Machine
3. Cutting Table
4. Sewing Machine
5. Hair Picker
6. Rack for Springs
7. Stuffing Bins
8. Shelving
9. Desk
10. Cupboard
11. Recitation Seats

roll edge, stiched edge, loose cushion, stationary seat, buttoned or plain back.

Process-to-Process Plan

The best method to teach upholstering work is by processes rather than jobs. A footstool may embody various processes, such as webbing, springing, roll edge, stitched edge, stuffing, covering, and gimping, and these same processes may later be found in the upholstery of a chair or a davenport.

Information

In connection with the actual work on upholstering, some time should be spent on related work such as information on the following:

Tools: Different kinds, where and how to use them.

Materials: Stuffings, why some are more resilient then others. Springs, different kinds and sizes, where used, etc. Types and sizes of tacks, nails, gimps, and where they are used.

Coverings: Different kinds, widths, qualities, selecting the right color to harmonize with other furnishings. Selecting the right kind of covering for certain rooms; such as cretonne or chintz for bedroom, porch, or sun parlors; leather or artificial leather for the library, etc.

Covering Yardage: Estimating and planning covering yardage on various types and sizes of furniture.

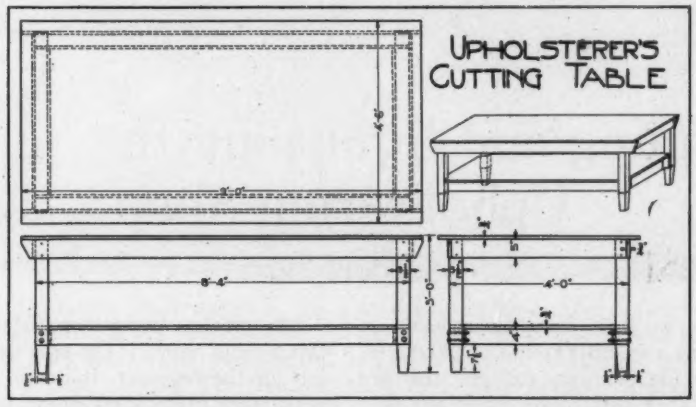
Selecting and Buying Covering

There are various upholstery supply houses who will gladly furnish schools with sample books of different kinds of covering which may be bought in cut lengths. This eliminates carrying coverings in stock and at the same time gives a wide selection to choose from.

Equipment

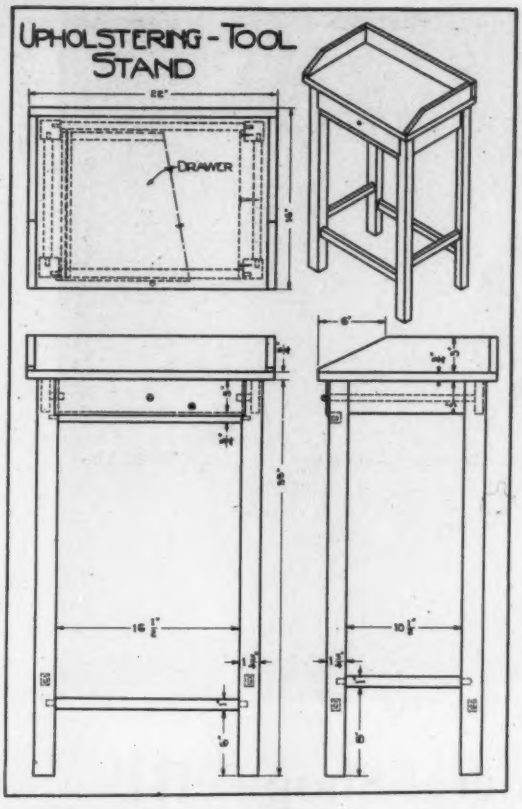
It is no great problem to equip a school upholstering shop as part of the equipment, such as the upholstering trestles, stands for tools and the cutting tables, may be made in the school woodshop.

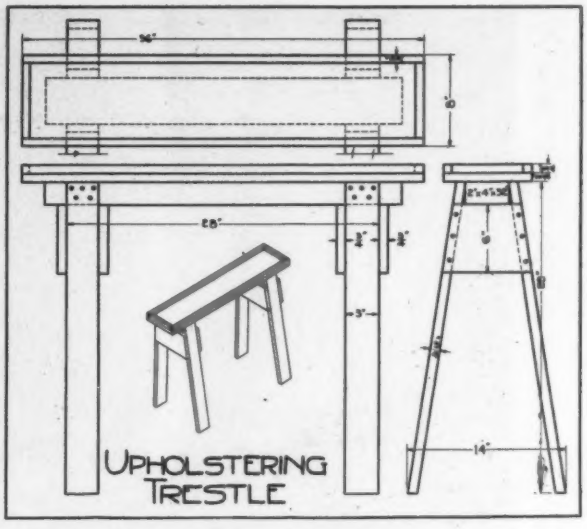
Upholstering Trestles: The one shown herewith is built according to standard sizes, as it must accommodate all kinds and types of furniture and should be



padded on top to prevent marring finished woodwork.

Stands: For students to place tacks, tools, etc. Should the students places be along the wall, a shelf 36 in. high can be run along the wall, thus eliminating



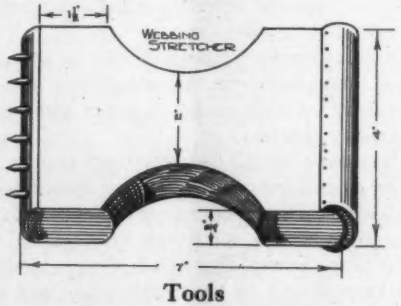


stands for this group. If, however, some of the students are required to work in the center of the room, stands, such as the one described herewith, must be provided for them for their tools, tacks, materials, etc.

Cutting Table: Due to the fact that most upholstery coverings are 50 and 54 in. wide, the cutting table should be wide enough to permit the covering to lie flat on the table without hanging over the sides. To accommodate the proper layout of covering, the table should be 9 ft. in length. However, where floor space is limited the table length may be made 7 or 8 ft.

Sewing machine: (motor driven) approximately	$100.00
Hair picker	65.00
Button machine, (complete with attachments)	11.00

These last three items, however, are only necessary where advanced work will be done.



Tools

For Class of 20 Students

20 Upholsterers' hammers	@ 2.00	$40.00
20 Shears	@ 2.00	40.00
10 Webbing stretchers	@ .50	5.00

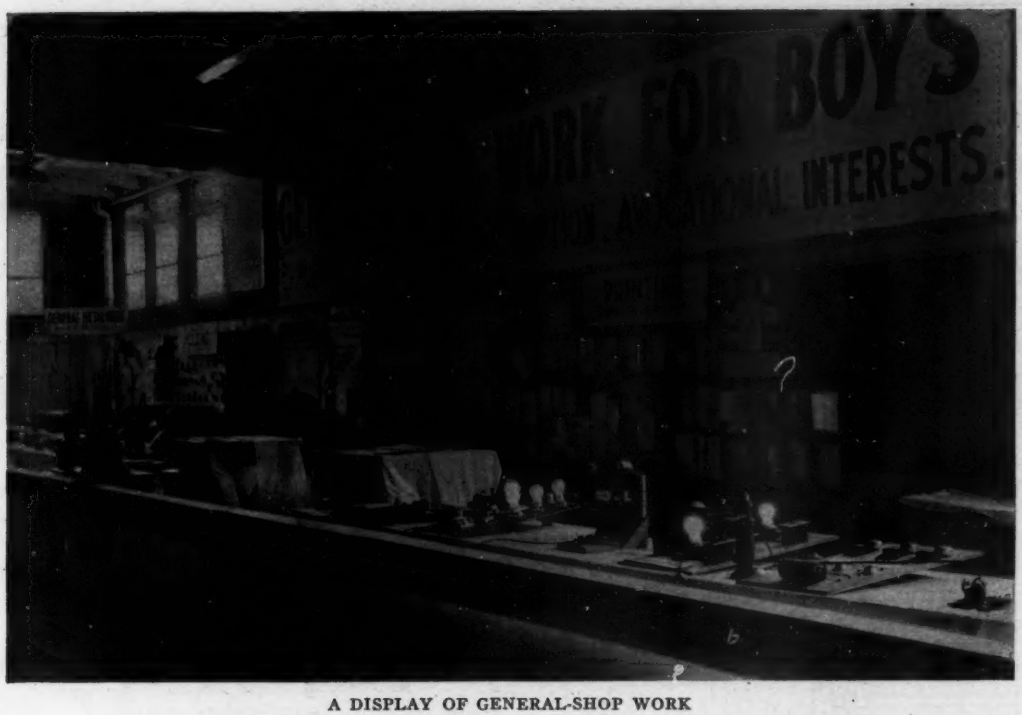
(The webbing stretchers could easily be made in the school woodshop as illustrated.)

½ doz. 8-in. Straight upholsterers' needles	1.00
½ doz. 12-in. Straight upholsterers' needles	1.50
½ doz. 6-in. Curved upholsterers' needles	.75
½ doz. 10-in. Curved upholsterers' needles	1.25
2 10-in. Regulators	1.00
3 doz. Skewers (upholsterers' pins)	.50
2 Trimming knives	.50
1 pair Pliers (wire-cutting type)	1.50
	$93.00

Supplies to Begin With

As mentioned in the foregoing, covering material may be bought as needed, but from an economical standpoint it seems logical that staple supplies should be bought in boxes and piece lots in order to get them at a lower price.

25 lb. 3-oz. Upholsterers' tacks	@ 15c	$ 3.75
25 lb. 6-oz. Upholsterers' tacks	@ 14c	3.50
25 lb. 10-oz. Upholsterers' tacks	@ 12c	3.00
5 lb. 3-oz. Gimp tacks	@ 16c	.80
1 piece 10-oz. Burlap, approximately 75 yd.	@ 15c	11.25
1 piece Muslin (unbleached) approximately 50 yd.	@ 13c	6.50
1 piece Cambric (black) approximately 50 yd.	@ 11c	5.50
6 pieces Webbing (B.F.M.)	@ 2.40	14.40
12 lb. Spring tying twine	@ 30c	3.60
3 lb. Stitching twine	@ 1.40	4.20
1 bale Tow (fine) approximately 100 lb.	@ 5c	5.00
1 bale Moss (XXXX) approximately 100 lb.	@ 15c	15.00
1 bale Cotton felt (12-oz.) approximately 100 lb.	@ 18c	18.00
1 bag Curled hair, approximately 50 lb.	@ 50c	25.00
1 gross (No. 2) Upholstery springs, 40 lb.	@ 9c	3.60
½ gross (No. 4) Upholstery springs, 35 lb.	@ 9c	3.15
½ gross 8-in. Pillow springs	@ 2.50	2.50
		$128.75



A DISPLAY OF GENERAL-SHOP WORK

Establishing the General Shop—III[1]

*William E. Warner**

12. *Project Storage.* Space for this may be provided in the hallway adjacent to the general shop, although many schemes for handling this essential element are found in practice. Built-in horizontal lockers 1 ft. high, 2 ft. deep, and 2 to 4 ft. long are desirable. Small projects may be checked in a comprehensive tool crib.

13. *General Storage Room* for larger and less-used materials may be provided in a basement or in some other room, located more distantly from the general shop than the immediate auxiliary rooms.

14. *Shop library and research room.* The room for this purpose should be included next to the shop office. It should include sketching facilities, a central conference table, and book shelves where individuals or groups of boys could discuss or work out mutual problems in relative quiet, without leaving the general shop itself.

15. *Experimental or assembly area.* Such a space may well be provided in a flexible type of general-shop layout, as it permits experimentation and construction of such interesting projects as airplanes, a garage, a cabin, an outboard or larger motor boat, an automobile, and the like. It will also permit the development of other units of general-shop work such as textiles, foods, and ceramics, if these prove desirable in the years to come.

16. *Instructional responsibilities.* Two or more teacher shops should be so arranged that a logical grouping of shop units may be centralized. This would mean that a teacher who is especially well prepared in woodworking would also handle the carpentry, sheet metal, and possibly concrete units; while another teacher who is a specialist in machine-shop work could also develop the automotive instruction and have general supervision of the molding and forging units.

17. *Principle of flexibility.* This is here postulated as of growing importance to effective teaching in the general shop. Surely no one is willing to say as yet exactly what units of work should ultimately be found in any given general-shop situation. It is conceivable that a ceramic, textile, food, nautical, or some such similar unit might well be justified. It is because of this principle that the fifteenth point above was listed as an important consideration.

18. *Aisles of travel.* These should be at least 4 ft. wide, and they should be so located that any part of the laboratory, as well as the entrance and exit doors, can be readily reached.

19. *All corners* should be used to advantage.

20. *Units that are closely related* should be placed near each other. Thus sheet metal and electricity might be close together, a soldering or melting furnace should be near the molding bench, concrete work, and woodworking should be near each other and near the exit, the machine shop and the auto shop should be easily reached from out of doors, a heat-treatment furnace should be accessible to the machine shop, and the woodworking and electrical shop should be near the experimental and assembly areas.

[1]Continued from August and September issues of INDUSTRIAL ARTS AND VOCATIONAL EDUCATION.

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THE WOODWORKING DISPLAY

21. *Tool crib or tool storage.* This should be centrally placed and of easy access to all parts of the laboratory. Large items like flasks, forging tongs, shovels for molding or concrete work, jacks for automotive work, and stakes for sheet-metal work, may well be left at the unit in question wherever provision for this is made. An efficiently operated tool crib of a comprehensive sort will materially correct the general confusion of small tools and many other loose items too commonly found in a general-shop situation.

22. *Per-pupil area.* The number of square feet per pupil should not be less than 50. If flexibility and an assembly area is desired, then considerably more, even double this space may well be provided. The example shown has an area of 118 sq. ft. per pupil.

23. *Washing facilities.* A sink and one or more lavatories should be provided in the general-shop room. At the same time, of course, the general shop should be placed in close proximity to the boys' toilet rooms.

24. *Noises and odors.* These are prevalent in many shops and laboratories and are oftentimes difficult to control. To prevent the odors from permeating the other classrooms, offending shops are now occasionally placed on the top floor of the building. Noisy shops are quieted by applying sound-deadening materials in the walls and ceilings of the room. Several commercial products are available for this purpose. This principle is also related to item four on this list, regarding the provision for higher ceilings in the shops. Separate exhausts or stacks are naturally maintained for the ceramic kiln, automotive exhaust, coal forge, mill sawdust and shavings, and spray booth. These exhausts are usually piped to interior courts.

Type and Extent of Equipment

Reasonably light, inexpensive, and flexible equipment is to be desired in a junior-high-school general shop where uncertainty still exists regarding the ultimate nature of such work. There is small likelihood that it will ever be possible in a public-school situation to exactly duplicate a real industrial setting for purposes of effective exploration. Equipment, then, may well be chosen that will lend itself to a wide range of projects more or less *illustrative* of present-day industries, projects that are in keeping with the interests of the boys who do them. Any appropriation for equipment should therefore be expended more extensively than intensively and over a period of time rather than all at once.

Instances of this first principle are seen in the woodworking unit through the use of a 6-in. bench jointer, 8-in. or 10-in. circular saw, a 16-in. to 20-in. band saw, and double benches approximately 4 by 5 ft. in size each to accommodate four boys; and in the machine-shop unit through the installation of 13 in. by 5-ft. engine lathes, a 1-horse-power duplex milling machine with table approximately 7 in. wide and 30 in. long with a 20-in. feed, a power hack saw of the lighter construction type, a 16-in. all-purpose standard shaper, a triple-purpose furnace, and coal or gas forges, the latter to be preferred because of the wide use that is being made of them in present-day industry.

The use of a comprehensive tool crib in the "General Laboratory of Industries" shown in the accompanying illustration, bears out the principle of adaptability in providing a place for the accommodation of a wide range of special items of equipment. This is in contrast to the procedure of several years ago where many tools like backsaws and block planes were duplicated on every individual workbench. Another instance of this is seen in the expenditure of something like $200 on a tool grinder for a small shop to the exclusion, perhaps, of more seriously needed items. Surely a hand grinder costing from $15 to $25

would be considered adequate in a small general shop for tool grinding, and in a comprehensive shop no more than $125 would be needed for a motor-in-head grinder to be placed, as seen in Figure 1, near the center of the shop.

Attention may be called to the use of individual trays approximately 2 in. deep, 12 in. wide, and 18 in. long. These would all be kept in a comprehensive tool crib and would be made up for special units of work as the occasion demanded. In contrast to this, formerly it was not considered possible to teach subjects like woodwork, turning, automotives, or electricity without a wide range of permanent tools for each pupil and type of work.

A list of the *major items of equipment* for some of the more common units of general-shop work may prove suggestive, although one of the most detailed and difficult tasks of all is to itemize the extensive list of smaller items required for such work.

1. *Automotives.* Cutaway chassis; engines on block with radiator, the exhaust to be wrapped with asbestos, and the fumes to be carried outside of the building; engines mounted on turntables; front axle; rear axle; transmission units; low, stout platforms with raised edges for axle and transmission units; utility workbench with two or more vises; 2-ton chain hoist; power tool grinder; portable electric drill with valve-grinder attachments and bench stand; breast drill; set of twist drills, 1/16 to ½ in. by 64ths; sets of S.A.E. taps and dies ¼ to ⅝ in.; set of machine-screw taps and dies, Nos. 6 to 18; set of adjustable reamers; 10-in. Stillson wrench; 8-in. monkey wrench; tube vulcanizer and materials; bearing scraper; portable lamp and cord; valve lifters of different types; valve-grinding compound; starting motor; generator; small battery charger; grease gun; battery thermometer; different makes of cars for study and repair.

2. *Ceramics.* Kiln; clay bin; large and small drip pans; plaster bin; casting table; several jars and bowls; wooden spoons, knives and large brushes; sponges; marble slab and muller; palette; spray gun; glazes; supply of pyrometric cones .06 to 1; metallic oxides for coloring; underglaze colors; glass jars with lids for glazes; potter's wheel.

3. *Concrete.* Most of the following equipment can be added to a general shop with very little additional expense and can be kept in a comparatively small space. This work also can be done out of doors. Mixing platform; measuring boxes; 4 by 8-in. wooden floats; 2 by 2-ft. mixing boards; plasterer's trowels; mason's trowels; water container; screens ¼ and ¾-in. mesh; square-point shovels; small wire brush; 10-quart pails; hoppers or bins for sand, cement, and different aggregates.

4. *Drawing and design* facilities for two or more pupils should be included in every general-shop layout as indicated in both of the plans shown.

5. *Electrical.* Woodworking benches may be used in lieu of more satisfactory tables or wall benches. Panels may be placed on wall space and stored when not in use. The following tools are needed: File, ball-peen hammer, voltmeter, ammeter, bell-ringing transformer, receptacles, sockets, pliers, switches, dry cells, screw drivers, brace and bits, hack saw, wrenches, compass saw, small motors, hydrometer, storage battery, assorted wire, assorted fuses, pipe wrench, pipe vise, bench vise, automobile generator, set of spark plugs, coils, and timer.

6. *General metals.* Utility bench; machinist's vises; 13 in. by 5-ft. engine lathes; drill press; electric bench grinder; combination furnace; shaper and small millers optional.

7. *Molding.* Metal-lined molding bench and pan, brass sand, ladle, graphite crucibles, No. 25 Johnson bench furnace, brass melting furnace, tongs and ladle carrier, No. 10 and No. 4 riddles, aluminum snap flasks, shovels, bellows, sprinkler, pig mold, and small tools.

8. *Printing.* Job presses; lever paper cutter; Boston stitcher; type cabinets; California job cases; leader box; quarter-size rule case; imposing table; utility table; composing sticks; pressed steel galleys; benzine can; benzine brush; hickory mallet; type planer; proof planer; quoins; quoin key; gauge pins; ink knife; waste can; assortment of printing inks in tubes; quantities of Century schoolbook type, Century schoolbook bold, engravers Old English, Century schoolbook italic, and heavy Copperplate Gothic; quantities of lears, slugs, brass rule, line leaders; braces and dashes; fractions and references; and novelty types.

9. *Sheet metal.* Layout bench; rolls; bar folder; circular shears; squaring shears; stakes (blow horn, square conductor, hatchet, bottom, double seaming and hollow mandrel); bench plate; gas furnace; turning, setting down, wiring, and burring machines.

10. *Woodworking.* Band saw, jointer, lathe, circular saw, planer, double (four-vise) 4 by 5-ft. workbenches, glue pot, and broad range of special tools for crib, also junior jack planes, marking gauges, plain try-squares, and rules for individual use.

11. *General* (as shown in illustration). Tool crib, conference and general tables, storage bins, shelves and drawers, finishing booth and apparatus, machinist's vises, steel folding chairs, washing facilities, built-in, lighted show cases, anvils, office furniture, 24-in. steel stools, and a generous number of reference books.

(To be continued)

ARMCHAIR—CAROLEAN TYPE, CANED SEAT AND BACK, SPIRAL TURNING, AND CARVING

(Courtesy, Metropolitan Museum of Art, New York, N. Y.)

Safety-First Rules Prevent Accidents

*Paul Albright**

IF every shop instructor made safety a factor in his instructions, fewer accidents would occur in the school shops.

The modern shop has machines, which, even though well guarded, will cause injuries if not properly used. The greatest amount of good cannot be achieved with machines if only a select few may use them. Properly instructed, the average boy can operate any machine with comparative safety.

If the machines are used by selected boys only, it is possible that fear of machinery will be engendered in the boys who are not allowed the privilege of using them. It is much better that all boys be properly instructed in the use of the machinery. Of course, this instruction must emphasize safety. Large industries reward their safe employees. How many school-shop instructors reward their safe students?

Since we put the following rules in force, we have had not even a minor accident. Not only does this plan tend to prevent accidents, but it furnishes a goal for the boys to strive for, creates lots of interest, and above all makes safety a vital thing.

SAFETY RULES

For Students in the Manual-Training Department

General Information

These rules are issued for the purpose of preventing injury and your coöperation in carrying them out should be one of the considerations you give to your school.

Safety should be the first consideration of every student in the shop, and the student must familiarize himself with the dangers surrounding his work, and he must heed all warnings given either orally or in writing. Each student should not only consider his own safety but the safety of others as well.

Remember to be careful under all circumstances. When caution becomes a habit, there will be but few injuries, and prevention of accidents is one of the most important duties to yourself and to others.

Each student will be held responsible for the violation of the rules, and is expected to report violations on the part of others. The fact that one student violates the rules will not be accepted as an excuse for violation of the rules by others.

Vigilence and watchfulness insure safety.

Hazards are incident to all classes of work. Some work, however, is more hazardous than others, but in all cases the safest methods must be followed.

Students are forbidden to leave their place of work to go to other parts of the shop except by permission.

Rules

1. In expediting work, remember *Safety*.
2. Students should familiarize themselves with the tools and machinery with which they have to work, and should know for themselves that they are in proper condition before being used. Any tool found defective should be reported or turned in at the toolroom.
3. Students should report promptly any unsafe condition or dangerous practice that may cause an accident.
4. It is dangerous to wear loose clothing, ties, or rings around machinery.
5. *Wrestling, fighting, throwing of material, fooling, or practical joking while on the job is positively prohibited.*
6. Students should know the location of fire extinguishers in the room. In case of fire, promptly turn in the alarm. Use of fire extinguishers will be discussed regularly.
7. *Passages* should be kept *clear. Rubbish and scrap wood* should not be allowed to accumulate.
8. Material should not be piled too high, nor in such manner that it is liable to fall.
9. *Goggles* should be worn at all times when there is danger of flying particles entering the eye. Your attention is called to the following, which are some of the specific instances where goggles should be worn: Drilling, grinding on emery wheels, breaking or hammering cast iron, straightening or bending bolts, cutting off rivets or bolts, splitting nuts, scraping off dry paint or glue, ripping fir lumber, working on woodworking machinery which is not equipped with suction or blower, or while working with acid or lye.
10. Under no circumstances should guards be removed from machinery for the sake of convenience. Students should replace guards which have been removed for any purpose, and machines should not be operated unless the guards are in their proper place.
11. Never stand directly in front of a man who is using a hammer when it is possible to stand to one side.
12. Special attention should be given to boards containing protruding nails. Place them so they will not be a source of injury, or remove or bend down the nails.
13. In all cases of injury or accident, no matter how trivial, report at once. It is important to take care of small injuries promptly, as they may result seriously.
14. Repairs, oiling, or adjusting should not be done while the machinery is in operation.
15. Students should not engage in *unnecessary conversation* while operating machinery.
16. Students should exercise care that no one is in a position to be injured before turning on electricity or putting any machinery in motion.
17. Only authorized students are allowed to use machinery.
18. Oily waste should not be allowed to accumulate, and drawers, lockers, and cupboards should be kept clear of inflammable material.
19. The toolroom keeper will be held responsible for conditions in the toolroom.
20. *When work is completed, tools and materials should not be left out.*

Each student should at all times keep in mind the purpose of these rules. *Safety, First, Last and Always.*

To make safety popular, inaugurate interdepartment safety contests. The rules of such a contest follow.

Each accident occurring, whether minor or otherwise, shall count as one point against the group in which it occurs.

The violation of a rule will count as one point against a group.

Every four weeks the two groups having the lowest number of points shall be awarded.

The result by week shall be posted each Monday.

At the end of the school year, a tour of some of the most interesting industries of the city or vicinity shall be made by the group having the lowest number of points against them.

*Instructor of Woodworking, Senior High School, Cheyenne, Wyoming.

INDUSTRIAL ARTS and VOCATIONAL EDUCATION

J. J. Metz, Editor

HAVING DEFINITE OBJECTIVES

Just as the autoist who is traversing roads with which he is unfamiliar needs a road map, so the teacher in his journey through the maze of the year's work must adhere closely to some guiding principle if he is to be certain that his job is done in a sequential, workmanlike, and efficient manner. This guiding principle must be something definite. It must not merely be chimerical but rather something that can be put down in black on white so that it can be studied, discussed, thought about, and referred to whenever necessary.

Of course, objectives may be formulated without being actually written down. There is a danger, however, that unless they are definitely put down, they will not function as specifically as they should.

It is common knowledge that a plan once developed, tends to disintegrate into a smaller and smaller number of integral parts, the longer it is used; so more and more of the finer details of a list of objectives are sloughed off unless they are carefully written out in such a manner that they can be checked over again and again as the work of the school year advances.

Professor William L. Hunter, of Iowa State College, Ames, Iowa, who has devised the following, sets an example which may well be emulated by others whose duties are made easier by having a definite set of objectives before them.

Industrial-Arts Objectives

Invite the boy to explore his interests and aptitudes.
Number educational and vocational guidance among their major aims.
Develop an amateur ability in handling tools and machines.
Utilize opportunities to develop hobbies.
Sample the major divisions of industry.
Teach consumers' knowledges and appreciation.
Regard it important to develop good personal and social habits.
Instill proper attitudes toward workers in other occupations.
Attempt to make the boy a handyman around the home.
Launch juveniles into the world better able to earn a living.

Afford an opportunity to experiment with scientific principles.
Reflect trends in the industrial world.
Tie up with and integrate the other school subjects.
Stimulate creative thinking.

Having definite objectives is not enough however, because if they are to function properly they must be recognized, not only by the teacher, but also by the student. Knowing the objectives, both will be able at all times to definitely ascertain that the educational machine is not only in motion but that it is moving in the right direction.

What has been said in the foregoing is true of general objectives, but it is no less true of the immediate objectives of each succeeding lesson. It is self-evident, of course, that these two sets of objectives must not be at variance. On the contrary, the strictest harmony must exist between them at all times, for only then can the work be said to be correctly planned.

HOW LONG IS A HUMAN LIFE?

It is the inexorable law of nature that man should die. This law is operative whether its victim be prince or pauper, poet or peasant.

Every great movement, be it educational or otherwise, has its leaders — these, too, are under the same law, and no matter how little they seemingly can be spared, death's call brooks of no delay. The need of the world, the love of family and friends — nothing deters death. He calls and man must obey.

Since this is true, one would at first conclude that great movements would abruptly come to an end when one of its important leaders dies. A wise Providence has seen to it, however, that other chosen men arise and carry on so that in the end the work of the world is not irreparably harmed.

To us, however, who must necessarily view happenings at short range and with finite understanding, it frequently seems lamentable that men whom we look upon as the natural key men in certain undertakings have a span of life that is all too short. However, when we study such lives it is quite apparent that the Destiny that rules life, instills in these short-lived workers an eagerness to be at their work which is not equalled by the ordinary human.

As an example, take the life of Robert H. Rodgers, who recently succumbed to a heart attack. Now that we have lost this capable, much-respected leader in teacher-training work, it is apparent what a clearly blazed path he left which runs all the way through the vocational-education and vocational-guidance movement in this country.

Looking backwards, it seems almost a miracle how well Mr. Rodgers planned his life. First, there is the apprenticeship which prepared him for a skilled trade. It is easy to picture him as an eager, careful, painstaking learner, ever alert, ever anxious to learn how to do expertly the things demanded of the journeyman in his chosen trade.

Then comes the first achievement, the finishing of his apprenticeship and his entry into the coveted domain of the skilled mechanic. The restless mind, however, is not long satisfied, and ambition and a ceaseless urge to do something greater, leads him to prepare himself for teaching the industrial arts. With energy he enters this new field and quickly he rises to supervisory and teacher-training positions. Then comes a period of executive-supervisory work in the department of education in the State of New York, which is followed by the notable work which he performed as the head of the teacher-training and research department at the Milwaukee Vocational School.

In every phase of the work, he stood forth as one of the leaders. There was little of the press agent about Mr. Rodgers; he did little grand-stand work, he spent few thoughts on how to advertise himself. Instead, his

energies were ever directed toward doing the job on which he was engaged, in the best possible manner.

Did he know that he had to work hard and fast to fill to the utmost the short span of life allotted to him? One would almost think so, remembering the man and his boundless energy. Yet with all his anxiety to turn out not only a good piece of work, but also a big piece of work, he never forgot that those who worked under his direction needed encouragement, kindness, leniency, judicious praise. For the shortcomings of others he was ready to make excuses, for himself he could make no allowances.

Is not his mode of life an answer to the question, "How long is life?" Does it not show us that life ought not be measured by years but by deeds and accomplishments, and measured in that way, the short 46 years of Mr. Rodgers' life are a long and honorable career, freely and gladly and gloriously spent in the development of the one phase of education which so vitally affects the lives of 90 per cent of our people.

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PROPER AND IMPROPER ATTITUDES

Just as a superabundance of self-confidence spells disaster to the one who possesses it, so an overestimation of one's own merits, especially if blatantly displayed, makes one ridiculous in the eyes of others.

The teacher especially must avoid these extremes. Boys possess more perspicacity than is usually credited to them, and they have a knack of looking through shams. The teacher, therefore, who is trying to appear what he is not, is soon at a terrible disadvantage with a class of ferret-eyed youngsters who are on the lookout for their teacher's "number."

This, of course, should not deter one from having a proper amount of self-confidence nor of a proper and sane appreciation of one's own worth, and the teacher, especially the beginner should be extremely careful to avoid making the error of minimizing the need of developing the right mental attitudes on these two human qualities. Extremes must, however, be avoided. The teacher, for instance, who poses as an absolute authority on any and every subject that may be mentioned, places himself into an almost indefensible position, while the one who honestly admits that there are many things about which he knows nothing, but few about which he is not willing to learn something if that is necessary, places himself in a much more advantageous and much less assailable position with his students.

Adults do not readily take to a "know-it-all" — the schoolboy does not take to him at all. The beginner teacher, therefore, who does not place too much stress on what he knows, either in the classroom or before his fellow teachers, avoids handicapping himself from the outset, and makes his whole-hearted all-around acceptance much more certain.

The possession of an honest-to-goodness willingness to do one's duty, the willingness to do a little more than is asked, the striving to sympathetically understand the other fellow's problems, the making of a sincere effort to render real service — these are very much better than the finest pose which can be assumed, and the spiritual satisfaction which results from these efforts will far outweigh the shallow gratification which accompanies the trying to appear what one is not.

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THE SCHOOL'S OPPORTUNITY

As has already been pointed out in these columns, the industrial-arts program in school can and does do much to overcome juvenile delinquency. The effect of this part of the educational machinery can be extended, however, by opening the shops, not only to the youth in school, but also to adults after school hours, in the evening, and on Saturday afternoons.

The following, taken from an editorial in the September 6th edition of *Collier's* tells a story that cannot be lightly overlooked, and if the schools can help to solve the problem it will be to their advantage and honor to do so.

"Police reports from cities having a total population of more than 25,000,000 — nearly a quarter of the country — were collected. The results were amazing.

"Within 10 years crime has increased 150 per cent while the population has grown only 20 per cent.

"The police records of 88 cities, having more than a third of the urban population of the country, showed that last year on the average 1 out of every 10.6 persons was arrested.

"From actual records it was estimated that more than 6,300,000 arrests were made in American cities last year. Upwards of 200,000 involved robbery, burglary, and similar crimes. There were about 3,000,000 traffic-law violations.

"Forty-six cities which have reports for both years, showing 16,905 arrests for robbery, burglary and theft in 1920, reported 52,751, an increase of 212 per cent, last year. Serious crime gained in percentage ten times as much as the population."

With the school shops available after school hours, the members of the neighborhood gang can be interested in producing rather than in destroying. With their energies directed into worth-while channels, delinquency will be more and more eradicated.

As a matter of fact, the more men, women, and children, that can be induced to spend their spare time in accomplishing something worth while in our school shops, laboratories, and home-economics rooms, the more will social attitudes take the place of antisocial outbreaks. Furthermore, the school will mean more in the life of the community and the overhead chargeable because of nonuse of schoolrooms and equipment will be decreased.

Much more than the economic gain that will be achieved, however, will be the gain in civic efficiency, in the better preparation which is given to youth, in the better way in which leisure will be used, and in the aim and direction which will be given to the lives of those with whom the school comes in contact.

EQUAL OPPORTUNITY

We cannot in fairness continue to provide specialized education free to the few who propose to enter the professions, while denying education to the many for commoner vocations. — *Herbert Hoover.*

Repairwork a Part of the Program of Farm Mechanics

*M. F. Thurmond**

REPAIRWORK on the farm is recognized as the most important part of the farmer's work in the shop. Each day it is necessary to do some repair job. Unless the repairwork is constantly in progress the place will soon run down. The fences and gates are to be kept up, all kinds of small mechanical jobs about the house crop up, from planing off the top of a door so that it will close, to the remodeling of the home. Besides these small jobs the problem of repairing farm machinery is one that confronts the farmer. With the steady growth and use of new machines the repair problems are becoming more important each day.

If the boys who are now in school are to operate, care for, and repair the machines that are used on the farm, they should have a knowledge of the skills required to do these jobs.

Repairwork fits very nicely into the general high-school shop. It should be a part of the course, and should occupy a place in the curriculum during the entire school year.

A special week or day should be devoted to repairwork alone. If this is done many jobs will be brought in for overhauling or repair. These jobs will connect farm and school more closely. As the sharp butcher knife or sharp saw goes back to the parent, he becomes more interested in what the boy is doing at school, and he begins to realize more and more the value of school shopwork.

Where special repair days are designated, the work can be done without interfering with the program.

There are hundreds of good repair jobs at the boy's home which may well be brought to the school shop. They are valuable not only from an educational standpoint, but they mean a saving to the boy's parents.

In the farm-mechanics course for teachers at Texas Agricultural and Mechanical College one day each term is designated "Fixit Day." Below is shown a list of the jobs done by 40 students. The students registered the jobs as they were completed, giving the name of the job, cost of materials required by it, the number of hours spent on it, and its increased value.

From the figure below it is shown that each student labor hour was worth 57 cents.

*Associate Professor of Agricultural Engineering, Agricultural and Mechanical College of Texas, College Station, Texas.

STUDENTS REPLACING GUARD PLATES ON A MOWER

Jobs	*Number Jobs*	*Cost Repair*	*Hours*	*Increased Value*
1. Sharpened saws	5	$ .30	5½	$3.25
2. Fitted hatchet handles	4	.30	2 2/3	1.50
3. Repair tub	1	.10	1	.50
4. Sharpened knives	19	.20	4¾	1.90
5. Fitted shovel handles	5	1.30	4½	4.85
6. Repaired belt buckle	1		1/6	.15
7. Repaired trunk tray	1		½	.35
8. Fitted hammer handles	5	.50	3½	2.60
9. Fitted hoe handles	5	1.00	2¾	2.35
10. Fitted rake handles	3	.85	2¾	1.80
11. Sharpened hoes	7	.25	2	1.50
12. Made clip boards	5	.95	4¾	3.00
13. Repaired typewriter box	1	.20	2 1/3	1.50
14. Cleaned auto rim	1		1¼	.50
15. Sharpened scissors	2		1/3	.40
16. Repaired bridle bits	1		½	.25
17. Repaired post-hole digger	1	.35	1/5	1.00
18. Repaired wooden mallet	1		1/6	.30
19. Soldered drinking fountains for poultry	15	.30	2½	3.00
20. Repaired log chain	1		¾	2.50
21. Repaired clip board	2	.10	¾	.65
22. Fitted saw handle	1	.20	½	.50
23. Repaired water bucket	2		¾	.50
24. Repaired table lamp	1		1/6	.25
25. Sharpened chisels	3		1/6	.10
26. Repaired ax handles	3	.15	2¼	1.40
27. Sharpened ax	1		½	.50
28. Repaired shovel	1		1/5	.10
29. Repaired pitchfork handles	3		3 1/3	1.90
30. Painted hoes	2	.20	1/3	.50
31. Soldered oil can	1		¼	.15
32. Sharpened tin snips	4		1¾	.80
33. Repaired boot spur	1		2	1.00
34. Repaired flash light	1		1	.50
35. Repaired cigarette case	1	.10	½	.50
36. Repaired chicken brooder	1	1.00	3	2.50
37. Fitted handle in screw driver	1	.10	1/6	.25
38. Sharpened bits	1		1½	1.00
39. Cleaned and repaired harness	1	.40	¾	1.00
40. Sharpened shears	1		½	.10
41. Sharpened hedge shears	1		½	.10
42. Sharpened pruning shears	1	.50	1	.50
43. Repaired single tree	1	.25	1½	2.50
44. Overhauled spring-tooth harrow	1	.50	10	2.50
45. Replaced guard plates on mower	1	1.25	6	4.25
TOTAL	121	$11.35	81½	$58.25
NET LABOR PROFIT				$43.90

Orientation for Industrial Students

*Carl A. Magnuson**

AN efficient method of education demands that the pupils be taught intelligently to adjust themselves to whatever conditions may arise. In the schools of the present day the attempt is made to attain this goal particularly by means of educational and vocational guidance. I have been especially concerned with this work in connection with coöperative industrial students; that is, students who will spend their first year in high school and for the following three years alternate two weeks between high school and their chosen industry. The two weeks in school are devoted to a pursuit of school studies, the two weeks in the shop to the acquiring of the skill and knowledge by the job itself.

An orientation course will help in the solution of such a guidance problem for freshmen, and at the same time take care of the problems that arise during the transition from the elementary school to the high school. The purpose of the orientation course is to acquaint the student with the school, the opportunities offered by the school, and how properly to adjust himself to the school and to his future industrial environment.

It is, of course, necessary for a student to know the various possibilities and requirements of trades and industries if he is to make an intelligent choice. The orientation course is especially designed to serve as a focus from which the individual student's ideas and adjustments may be drawn out. In advising a boy either scholastically or vocationally, his abilities must be carefully considered. It is not enough to study statistics and school records only, but the boy's ideas, incentives, and abilities must be carefully scrutinized as well.

The first step in the orientation course at the Bristol (Conn.) High School, is an attempt to adjust the student to the school. The school routine, the apportioning of time to study, the various extracurricular activities and their values are all discussed. From these discussions specific difficulties may be sensed by the counselor in charge. An opportunity is given during one or two regular class hours for a slight amount of consultation with the counselor, but, of course, the greater part of such counseling must be done outside of class. As the year progresses, character aims are laid before the boys, and their discussions and thoughts help to set up a picture for the class, and at the same time allow the counselor a better insight as regards individual adjustments.

During the second half-year, after those who have failed to meet the requirements have dropped out of school, the aim of the course changes more to that of occupational information and guidance. The work of the machinist, toolmaker, patternmaker, etc., are studied more specifically than the average vocational information course does when these trades are included under a general head. It is very necessary for apprentices to realize that when taking their places in the shop they must assume a more advanced adjustment to adult situations than the average high-school student.

The orientation course outline which follows goes far toward meeting the needs of the student apprentice, and is quite well adapted to the average high-school freshman. The one period a week given to this work has brought results far beyond anticipation.

First Half-Year

A. *School Life*

1. Description of school
   - *a*) Location of rooms, etc.
   - *b*) Teachers and departments
   - *c*) School routine (hours, vacations, absences, transportation, etc.)
   - *d*) Importance of study, assignments, and making up work missed
2. How to apportion time
   - *a*) Homework
   - *b*) Study periods
   - *c*) Recreation and exercise
   - *d*) Sleeping and eating
3. How to study
   - *a*) Reading subjects (memorizing)
4. How to study
   - *a*) Analyzing studies (library)
5. Extracurricular activities
   - *a*) Athletics
   - *b*) Nonathletic
   - *c*) Social

6–8. Discussion of special difficulties with opportunity for personal aid.

B. *Character aims*

9. Responsibility and good will
10. Coöperation and competition
11. Self-control and leadership
12. The value of habits
    - *a*) Inner satisfaction from work well done
    - *b*) Efficiency, thoroughness, promptness, initiative, and dependability
13. Discussion of school problems in the light of the foregoing
14. The value of an education
    - *a*) The purpose and tools of study
    - *b*) Applying the habits and knowledge gained from a proper education toward better living
    - *c*) Education continued throughout life
15. The importance of health in school and shop
    - *a*) Poor health as a handicap
    - *b*) How to preserve good health
    - *c*) How to keep healthy
16. Am I fitted for the coöperative industrial course
    - *a*) By desire and will to succeed
    - *b*) By temperament and aptitude
    - *c*) By realizing and conquering shortcomings
17. How to study for examinations
18. General discussion

Second Half-Year

C. *Occupational Information and Guidance*

1. The purpose of the coöperative industrial course during the remainder of this year and the summer months. (If possible, this talk should be given by the director.)
2. Special problems and questions
3. A bird's-eye view of industries in general
4. The machinist

*Bristol High School, Bristol, Connecticut.

5. The toolmaker and diemaker
6. The draftsman and engineer
7. The patternmaker
8. The foundry man
9. Discussion of all these branches
10. Factory administration and responsibility
    a) General consideration of departments
11. True apprenticeship
    a) Shopwork and experience
    b) Schoolwork and tools of study
    c) Opportunities and duties
12. Industries of the city open to apprentices
    a) Products manufactured
    b) Trade opportunities
    c) Advanced apprentices in plants
13. Characteristics needed for success in the shop
14. The uses of trade papers and books
15. Subjects to be studied in future years
16. Opportunities for success and satisfaction
    a) In school
    b) In the shop
    c) As a citizen of the community
17. Getting ready for work
18. General discussion

Sitting on the Lid

*Laurence Parker**

WHEN you are teaching your industrial-arts classes where are you? Of course, once in awhile a teacher is sitting at his desk or caring for the tool crib, but that is not the answer we are looking for.

I visited a shop not long ago and it looked as if the boys had "ganged up" on the instructor. He might have been down and out for all I could see of him at first.

There was a shouting mob of boys surrounding him all talking at once. They called him by his last name without any "Mister." They asked questions, they demanded supplies, and those on the edge of the mob tried to outshout those on the inside. Several not concerned, were skylarking around the benches.

When it was noticed that a visitor was present, the mob quieted by degrees and the instructor was able to come up for air.

"I have too many boys," he said. "I am very short of supplies," he added. "The boys are so eager to work they pester me to death for jobs," he continued.

*Director, Department of Smith-Hughes Vocational Education, Kansas State Teachers College, Pittsburg, Kansas.

He seemed to have tried to sit on the lid, in his teaching, but it had tilted up and seemed to be spilling him off. Perhaps he didn't have weight enough. He needed more system, a better method of ordering and getting supplies, more planning in giving out jobs, more dignity of the right sort so the boys would thoroughly respect his orders.

Shortly after, I visited another crowded shop. It was only the second week of school but all was going well. Every boy was at work. The instructor was moving around watching, teaching by suggestion here, demonstrating at another bench and cautioning another as to what he might expect would happen if he acted as he did. The boys seemed interested and the thought struck me that this instructor was a leader who was off ahead of his class in a great adventure in shopwork.

He was out ahead of them in his ordering of supplies, in his planning and organizing, and in his instruction.

Where are we in our jobs? Are we out ahead of the gang, or are we trying to sit on a badly tilting lid?

Mechanical Drawings from Foreign Countries

W. W. *Sturtevant***

MECHANICAL drafting is said to be a universal language and the statement is often made that a drawing made in one country could be read by the trained draftsman or mechanic in any other country.

While this statement is true in a general way, there are one or two slight modifications of it that should be mentioned when talking to the class in drawing. The principle of orthographic projection is the same in all countries, but most of the European countries draw in what is known as the first angle instead of the third angle, as is done in the United States. Another thing which might puzzle the draftsman asked to read a drawing made in another country is the difference in the conventions used. These conventions are the common methods of showing such things as threads, finish, etc., that are standardized by usage and considered good drafting-room practice, but which are not true representations of the object.

**South High School, Minneapolis, Minnesota.

Figure 1 shows what is meant by the first and third angles. If two planes intersect as shown, four angles are formed which may be numbered 1, 2, 3, and 4 respectively. In America, the object is assumed to be placed in the third angle, and the views swung into position as shown in Figures 2 and 3. This places the top view above the front view and the right end view at the right of the front view.

In Europe the object is assumed to be placed in the first angle and the position or relation of views is therefore different from that common in America. A study of Figures 4 and 5 shows that the top view is below the front view and the right end view is at the left of the front view.

In other words, the American system shows the views of the object as they would appear if projected on a transparent surface between the observer and the object, and the European system looks through the object and projects the lines on the surface behind it.

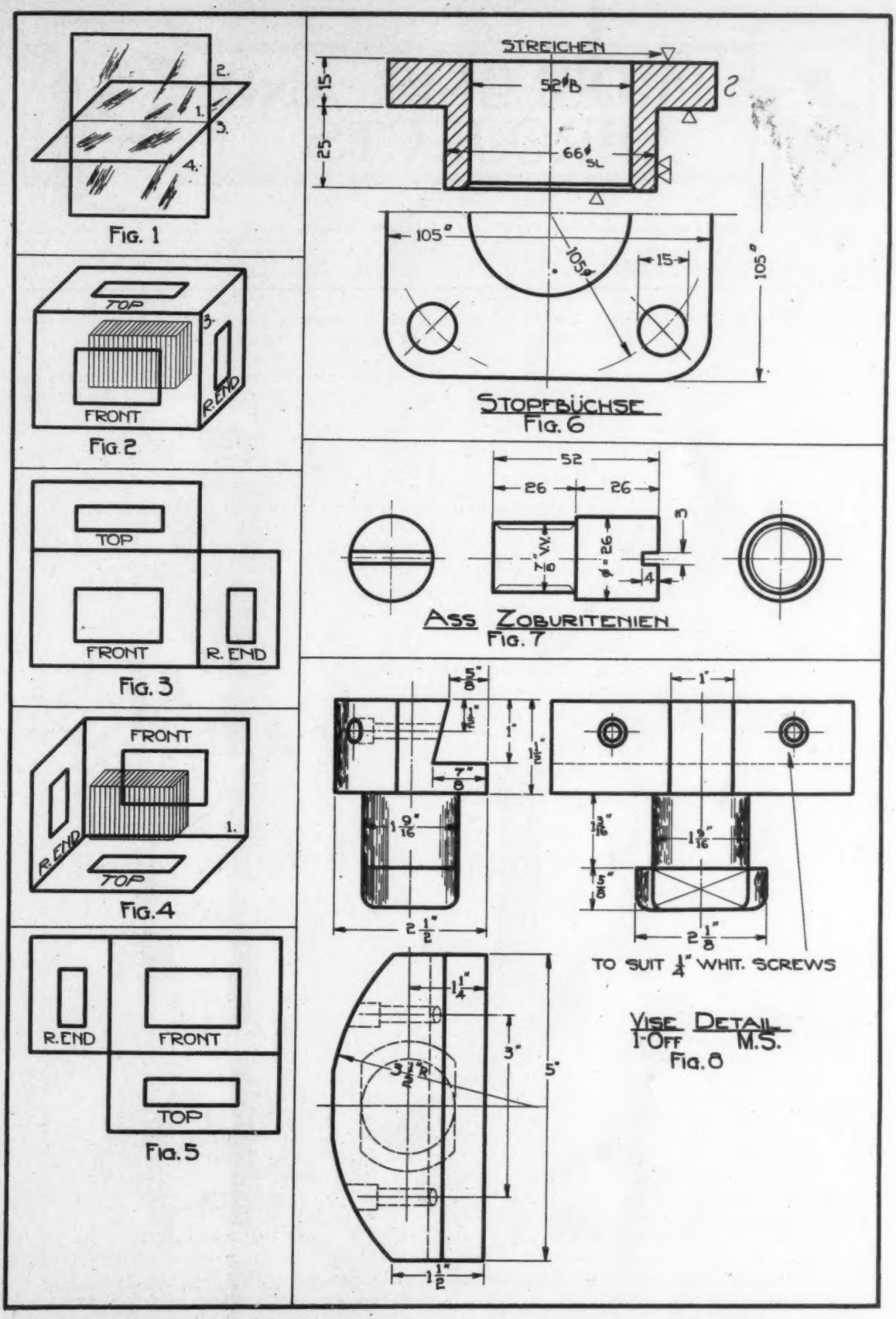


Figure 6 shows a drawing made in Berlin, Germany, Figure 7, one made in Riga, Latvia, and Figure 8 is a copy of a drawing made in Bristol, England. As may be seen all are first-angle projections.

PROBLEMS AND PROJECTS

This department aims to present a wide variety of class and shop projects in the Industrial Arts and Vocational Education. Successful problems are invited and will be paid for. A brief description of constructed problems, not exceeding 250 words in length, should be accompanied by a good working drawing. The originals of the problems in drawing and design should be sent.

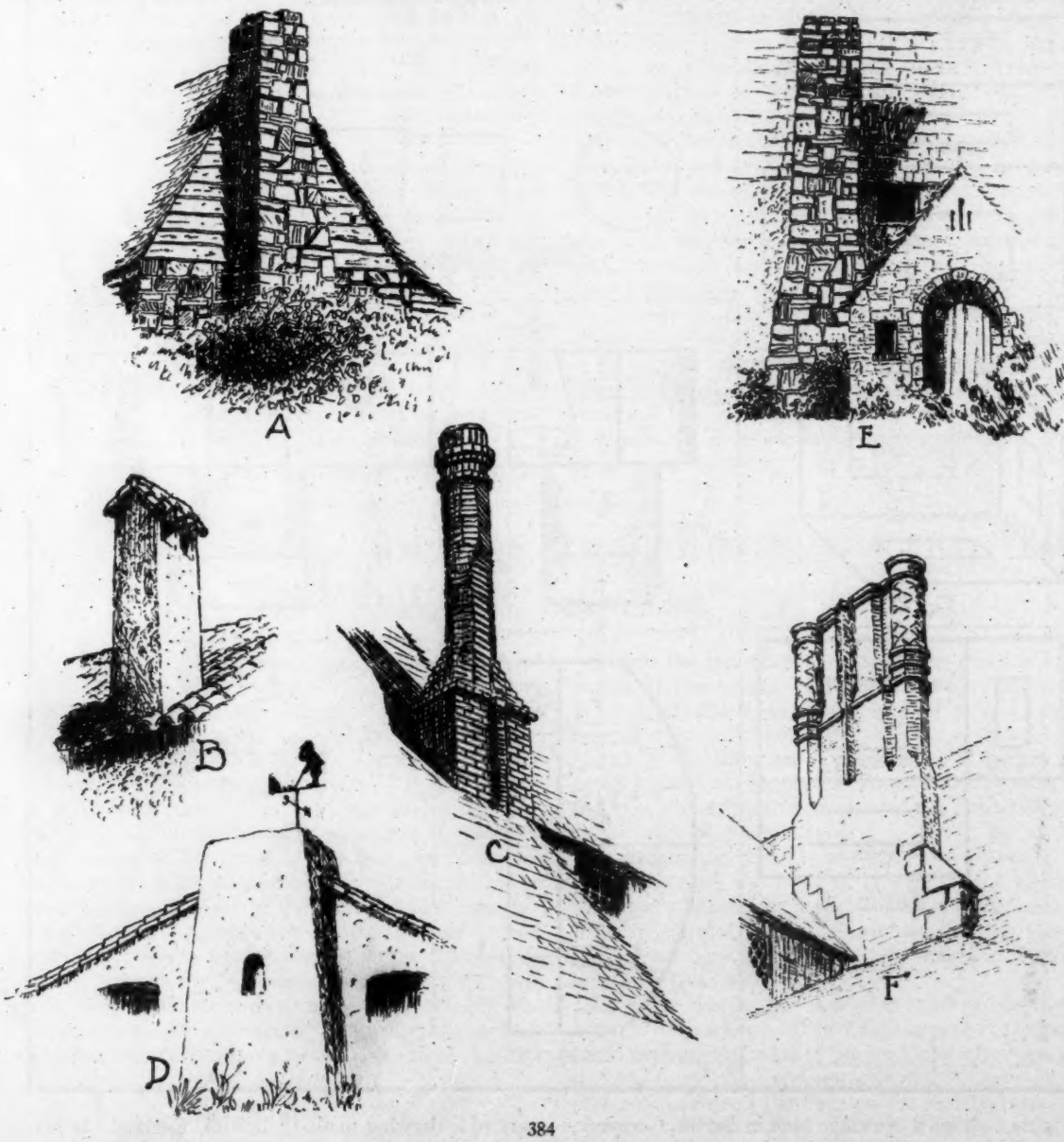
Problems in woodworking, turning, patternmaking, machine-shop practice, sheet-metal work, forging, foundry work, auto mechanics, auto electricity, electricity, architectural and mechanical drafting, printing, bookbinding, concrete work, farm mechanics, home mechanics, and other lines of industrial-arts work are desired for consideration.

CHIMNEYS FOR THE ARCHITECTURAL DRAFTSMAN

R. M. Hammes, Abraham Lincoln High School,
Council Bluffs, Iowa

The silhouette of a house against the sky creates a certain impression, which if analyzed, shows that the chimneys, with their smoke spiraling upward into the azure, play no small part in the sentiments engendered.

Chimneys are symbols of home and contentment. The lazily rising smoke gives the observer the feeling of warmth and cheer within the house of whose silhouette the chimney is an



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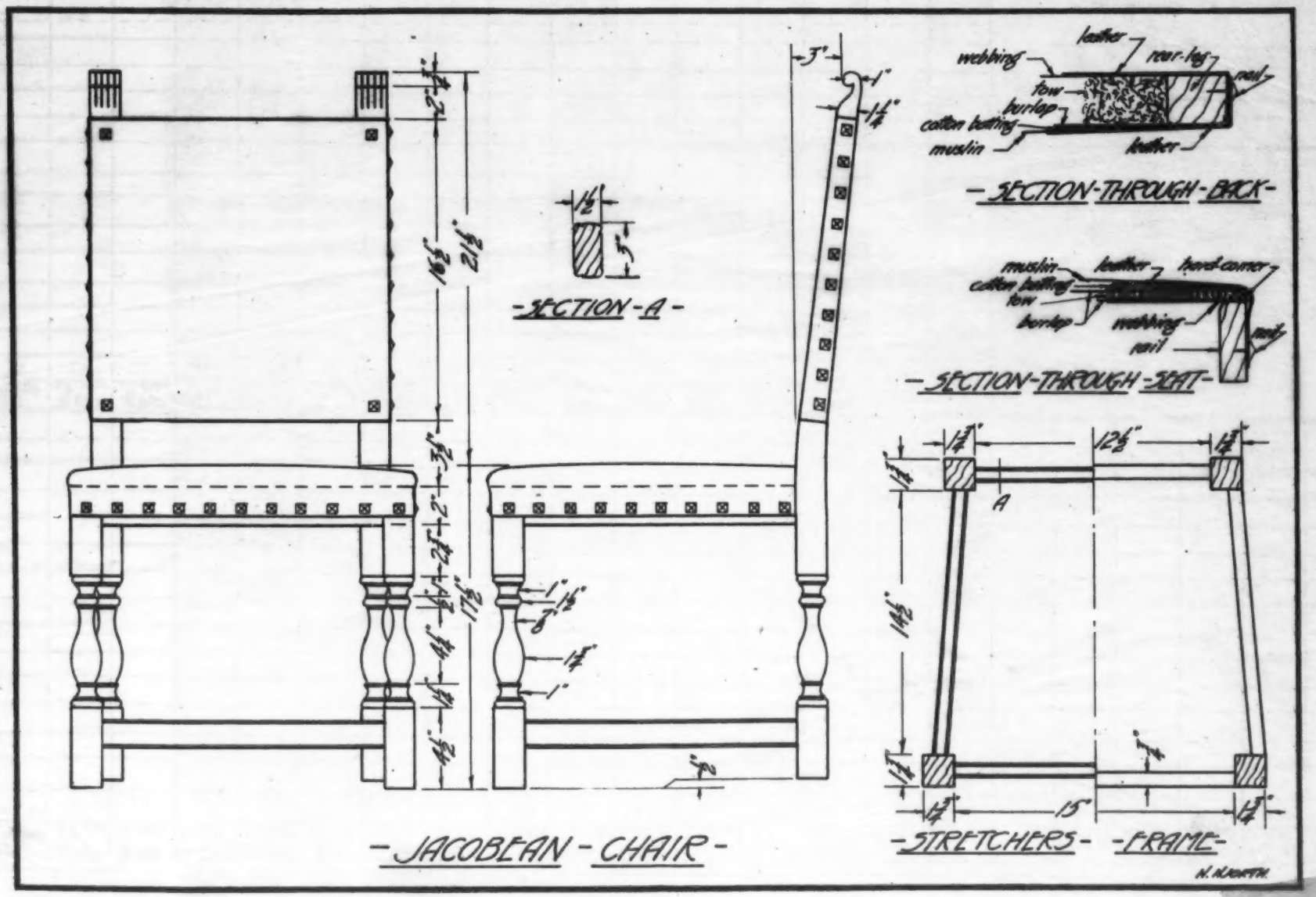

Designed by Herman Hjorth, Yonkers, New York

FIGURE 4

For Description See Page 385, Industrial Arts and Vocational Education, October, 1930

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OCTOBER, 1930

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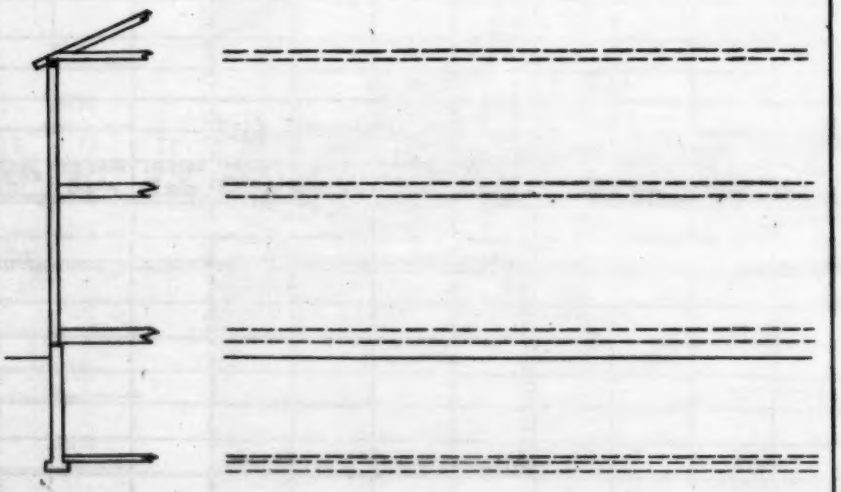
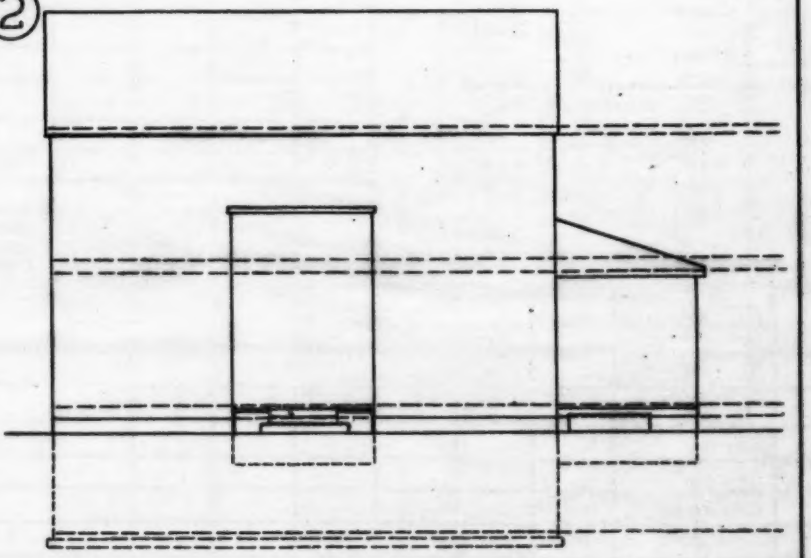
PROCEDURE for DRAWING an ELEVATION

①



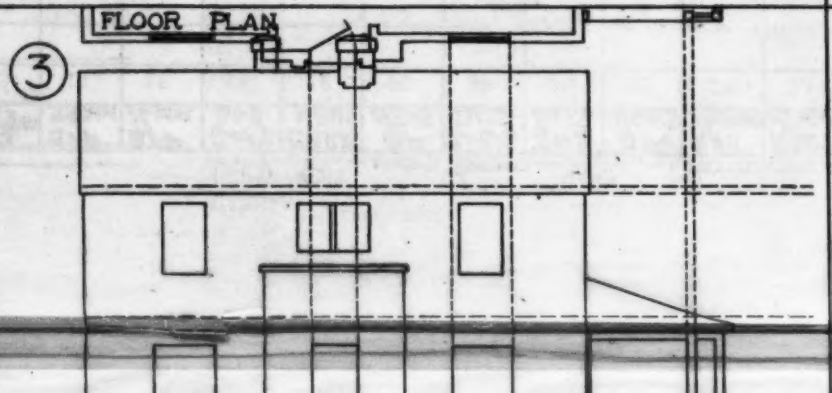
First, draw a wall section to ascertain the accurate heights of the grade, floors and ceilings. Next draw these lines on the elevation drawing.

②

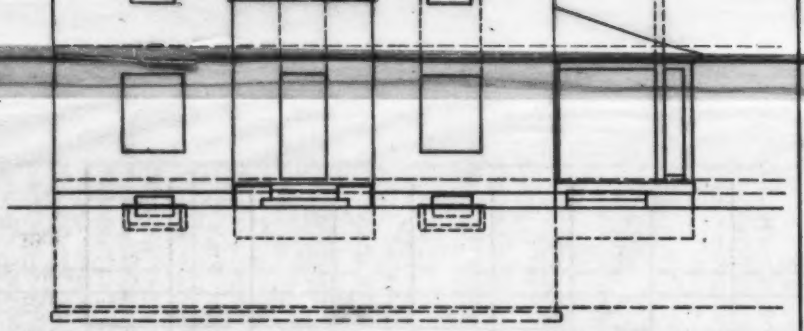


Draw lightly the main outline of the building including the cornice, roof, dormers, porch and the basement.

③



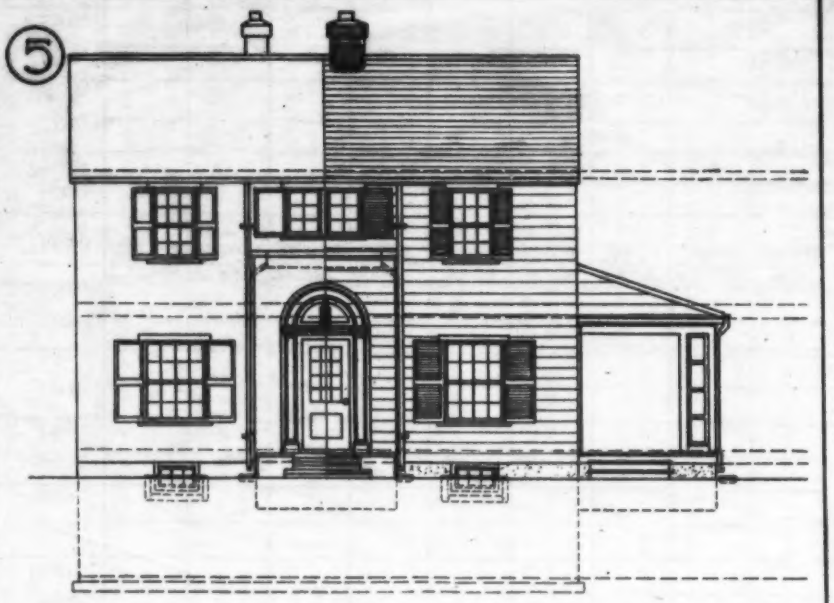
④



By transferring distances from the floor plan, outline the doors, windows, chimneys, porch columns, etc.

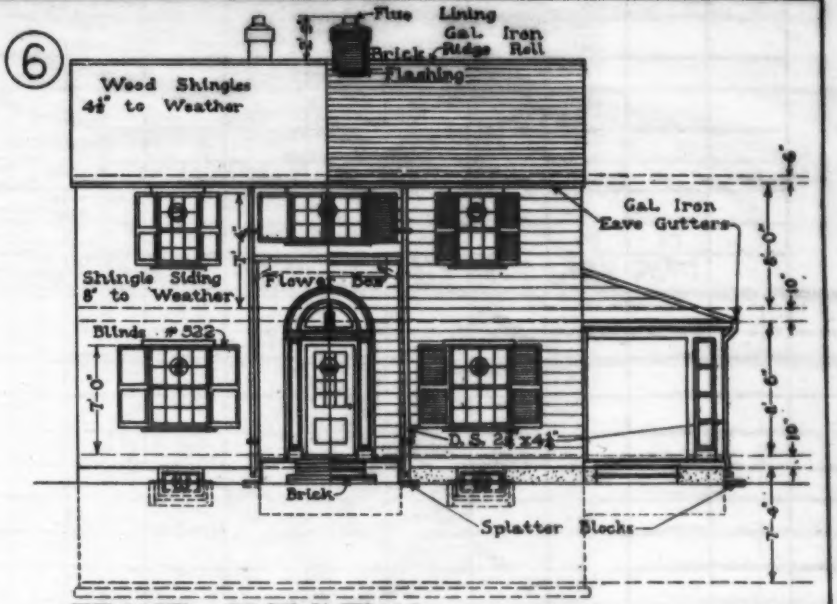
Before proceeding, see that the house, as outlined, results in a pleasing balance. Then, draw in the door, window, cornice, chimney and porch details.

5



Add the eaves, gutters, down spouts, splatter blocks, ridge roll, flashing and any other details. Make the necessary light lines to represent the roofing, bricks, siding, etc.

6



FRONT ELEVATION Scale $\frac{1}{8}$"=1'

Make all of the necessary notes and give the needed dimensions. Make the title, scale and nameplate of the drawing.

Designed by H. H. Robinson, Augusta, Kansas

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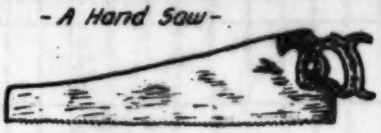
WOODWORK
CLIFFORD B. SMITH

STORY OF THE SAW

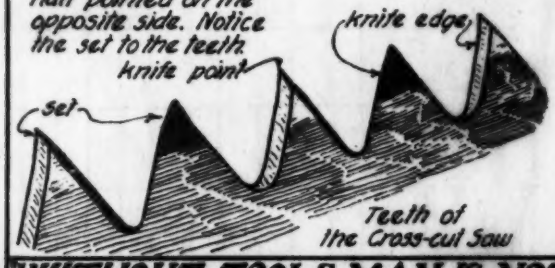
CLASS DEMONSTRATION
SHEET — D-1

- A Hand Saw -



The Cross-cut Saw has one-half of its teeth pointed on one side and the other half pointed on the opposite side. Notice the set to the teeth.

The Rip Saw has teeth just like the chisel. Notice the teeth bent left and right. This is called "set" and enables the teeth to cut a kerf wider than the saw is thick.



"WITHOUT TOOLS MAN IS NOTHING, WITH TOOLS HE IS ALL."

THE SUBJECT— The Saw:- its beginning, development and the action of the modern hand saw.

THE STORY— Boys, to-day we will talk about the hand saw. Who knows when this tool was made? Last year? No! Two or three years ago? Hardly! This saw has been in the process of being made for 50,000 years (or is it 500,000? Scientists do not know for certain.) It is not finished yet and may never be finished, unless men stop thinking.

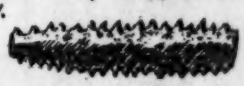
There was a time when mankind led a life of fear. Inferior in physical strength to the mammouth beasts of those days, he spent his time to a great extent in hiding.

But there came a day when, perhaps in an unfair fight, a man was the first to pick up a stone and throw it to kill. He started the conquest of the animal world.

About the same time, perhaps, some man was the first to take a rough stone to help wear thru a branch. This man used the principle of the saw for the first time and on that remote day, our saw started its long life.

Contrary to our own estimate, humans have a greater ox-like patience, than a quick intelligence. Only a few ever think. Most of us learn what others have thought and think second-handed. We learn 2+2 is 4. We do not think it. We plod along. It took thousands of years before a piece of flint was intentionly chipped on one edge to form a saw.

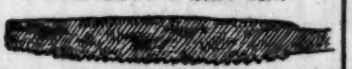
See illustration at -A-. Saws made like this one are found in the ground beside other remains.



-A- An early flint saw

There finally came a time when someone took the peculiar red stone, that did not crumble, and pounded it out flat. As he was gifted with something more than idle curiousity, he made possible a great improvement in saws. Teeth formed on this blade made the first saw that could pass thru wood in a thin cut.

Bronze is harder than copper and the men of this bronze age had advanced very far beyond their stone age forefathers. At this time the handles were tied on by thongs.



-B- A bronze saw

Thousands of years pass and many patient workers used these crude tools. The mass of people, then as now, lived and died, as you and I will no doubt do, without making one thing better for having lived. But in all ages, even as now, there are the few who by their deeds revolutionize society. They are not the contented ones, but seem filled with the spirit of unrest. They dream! They dare! They do!

To one, or several perhaps, of these we owe the age of steel. This is as certain, as the fact, that the age of electricity is due to only a few men. They made possible all of our modern life.

Saws with blades of steel, now make possible better teeth. Before this there was no difference in the teeth for ripping or for cross-cutting. But someone became dissatisfied with the action of the saw. He noticed that a tooth like a chisel made a clean cut with the grain, but tore the fibers in working across the grain; that a knife would score the wood fibers cleanly across the grain but not with the grain. Thus we have the rip saw with chisel-like teeth and the cross-cut saw with knife-like teeth.

-C- Action of chisel with the grain. A clean cut.

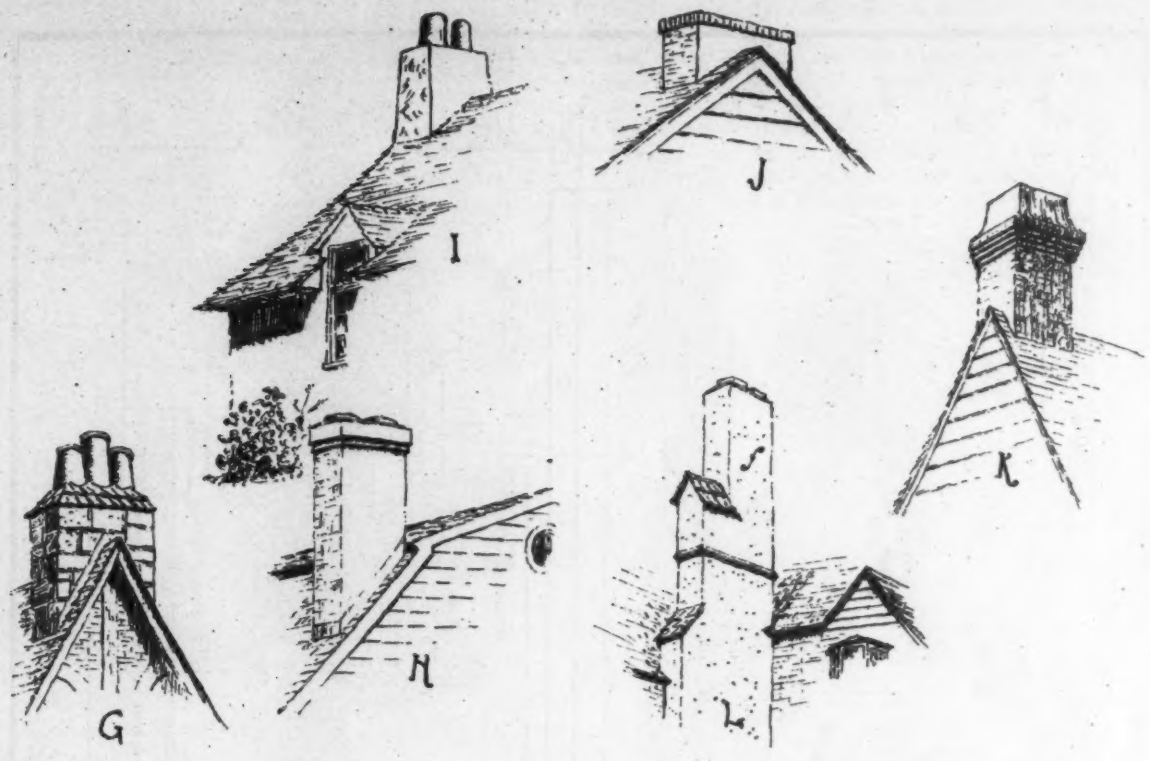
-D- Action of chisel across the grain

-E- Action of a knife in working across the grain.

Following these improvements came the setting of the teeth, the grinding of the blade to a taper, better handles, balancing of the saw, crown, etc.

THE MORAL— The lesson of the saw, if you have understood it, is this:- Know your saw, why it works and how. Use it to its utmost efficiency and then if you have mastered the 50,000 years of experience that is in that saw, see if your alert intelligence can improve any of the problems that we all are confronted with each day. Do not rip with the cross-cut or cross-cut with the rip.

Designed by Clifford B. Smith, Buffalo, New York



indispensable part. Therefore study carefully the design and materials to be used on the chimney so that it may express the feeling which the observer is to have upon viewing the house of which the chimney is a part.

The accompanying sketches show a few of an unlimited variety of designs. They may assist in the study of chimneys, and they represent a number of types from which one may make a selection in order to convey the feeling intended.

At A is shown an old stone chimney evidently rising from a fireplace of the same rugged material. Without effort we can imagine a kindly little old woman puttering before the fireplace below, and perhaps an old bewhiskered gentleman gazing over his "specs."

Beneath at B is a Mediterranean type of chimney with tiled roof to protect it from the heavy rains; a miniature house in keeping with the one below.

To the right, C, is an English-type chimney rising out of the corner of the roof in the form of a rectangle, and by ingenious laying of brick made to rear its stately form in the shape of an octagon surmounted by an interesting cap. The whole savoring of some staid old Englishman within.

Toward the lower left, at D, is a Spanish type dominating the gable end of what we immediately picture a wide squatty adobe dwelling suggestive of senors, senoritas, the click of castinets, friendliness, and hospitality.

A combination of entrance way and chimney is shown at E. This composition lends a strong note of warmth and welcome so desirable in the design of a home.

The Tudor chimney towering majestically over the roof at F brings us back to the days of brave knights and fair ladies. The regal dignity of this type is unsurpassed and it fittingly accentuates the heavy stone dwellings of which no doubt, it is a part.

The Normandy type at G with pointed shingled roof is interestingly capped by simple chimney pots. One can almost smell the must of age suggested in a dwelling with a gable end of this sort.

It is not difficult to picture a thrifty Dutch housewife setting things in order in the rooms below a chimney of the type shown at H. The chimney seems to grow out of the roof at the break of the pitch.

At I is shown another form of chimney of French origin very evidently intended for a smaller dwelling than the Normandy type. A simple plaster chimney, capped by two pots of different size.

The squat wide chimney at J without question surmounts a home of an Early American type of architecture.

Another chimney having an Early American flavor is the one shown at K evidently for a larger house than the one at J. The corbelling is surmounted by a plaster cap which swoops inward and upward.

A pleasing as well as amusing departure is shown at L. The pitches of the setbacks covered with shingles and matching the roof give the whole a picturesque touch. Much care and study must precede adventures of this sort however, to carry out the feeling one wishes to convey.

These chimneys suggest, in themselves, the designs of the houses they dominate. From them we can almost picture the lives of the folk who gather round the fireplaces below. Chimneys are symbols of warmth, cheerfulness, companionship, and contentment in the home, and outwardly they express their function of acting as a bulwark against wintry blasts and gales. The chimney with its graceful wisps of blue smoke rising against a background of stately trees will forever be the keynote of shelter and warmth, cheer and hospitality of the home. It is the first expression of individuality to be seen by any who approach a home. Think and plan carefully that the feeling conveyed by the chimney shall be one of strength, graciousness, and hospitality, so that the home which you are designing may be a thing of beauty and a source of joy to those who live in it as well as those who live around it.

FURNITURE PROBLEMS

Herman Hjorth, Saunders Trade School, Yonkers, New York

(See Supplement No. 188)

In connection with the article "The Study of Antiques in the School" published in the February, 1928, issue of the INDUSTRIAL-ARTS MAGAZINE, the following two problems in furniture construction, characteristic of the Jacobean period,

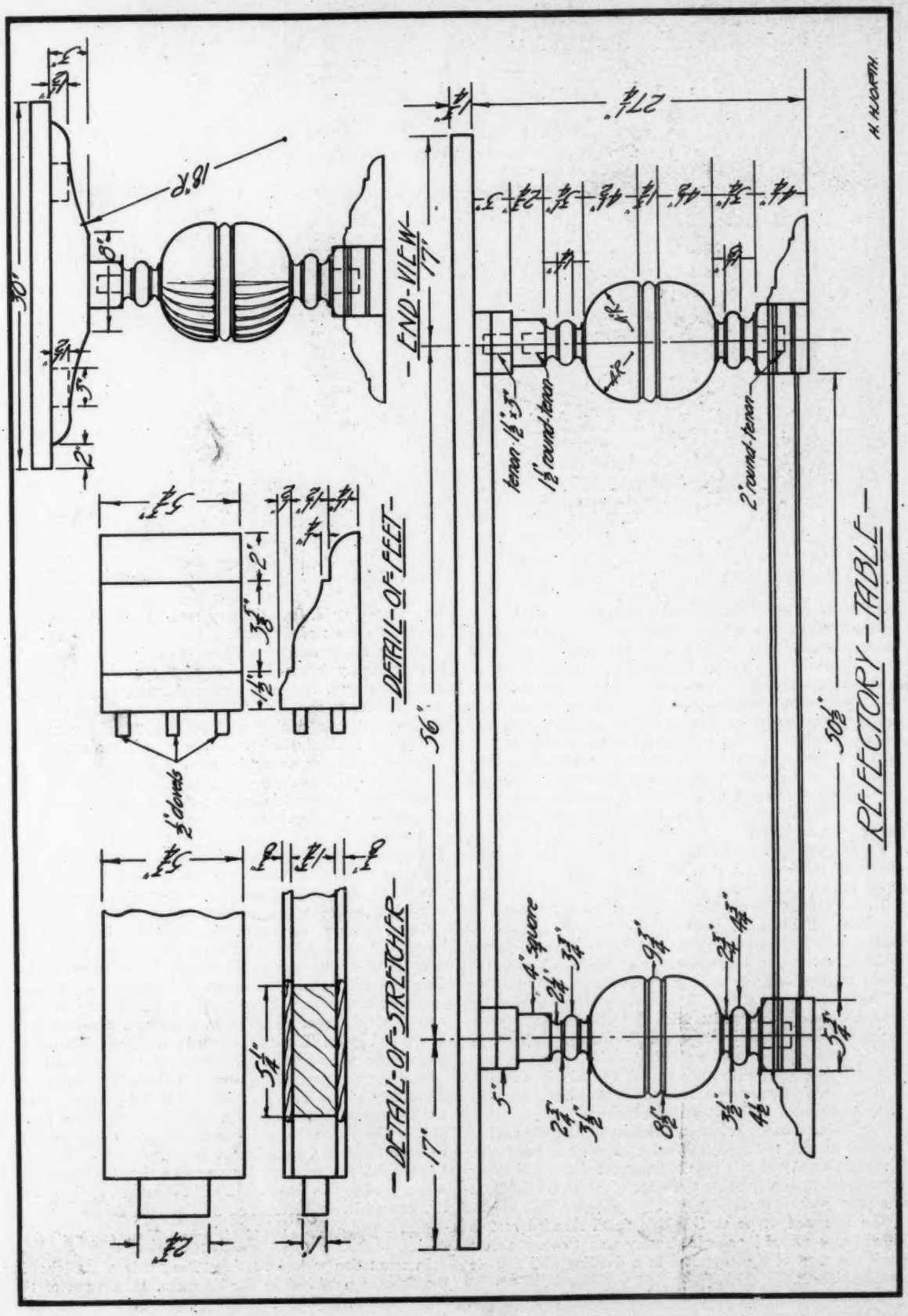

-REFECTORY-TABLE-
-END-VIEW-
-DETAIL-OF-FEET-
-DETAIL-OF-STRETCHER-
30"
18"R
27½"
17"
56"
50⅜"
2 round tenon
4 square
2 doves

FIG. 1

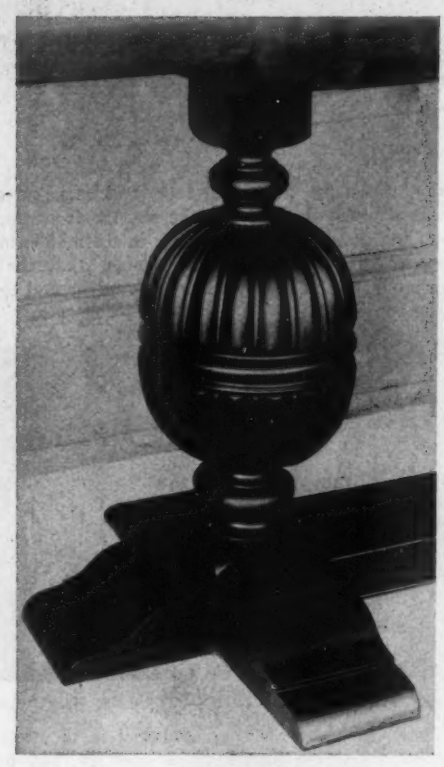


FIG. 2. DETAILS OF TABLE LEG

are herewith presented. They were designed by the writer and constructed by a 9th-grade boy.

The table is one of the so-called refectory or dining tables. It rests on two legs, which are connected with a stretcher. The latter is built up of three pieces so as to form beads, as shown in Figure 1. The legs were turned from a mahogany log over 10 in. in diameter. A tenon was turned on each end, to which square blocks, respectively 4 in. and 5¾ in. square, were glued. The reeding, which is clearly shown in Figures 2 and 3, was done by hand.

Six chairs, like the one illustrated in Figures 4 and 5, were made to go with the table. There is only one difficulty in connection with their construction; namely, the turning of the rear legs. This was solved in the following manner: A template was made, from which all the legs were marked and cut on the band saw. The wedge-shaped piece of wood, shown in Figure 6, was then screwed to each leg, after which the piece was set up in the lathe, and the leg turned. The upholstery of the back afterwards entirely covered the screw holes. If this had not been the case, it would have been necessary to glue the wedge-shaped pieces to the rear legs, and steam them off afterwards.

FIG. 5. DINING CHAIR
(For Fig. 4, see Supplement No. 188)

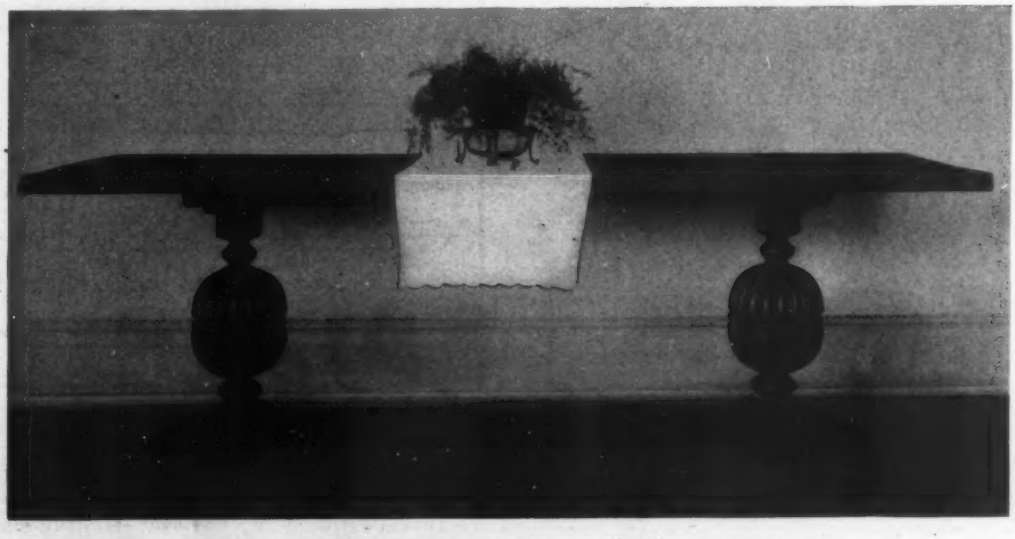


FIG. 3. MODERN REFECTORY TABLE—BULBOUS TURNING

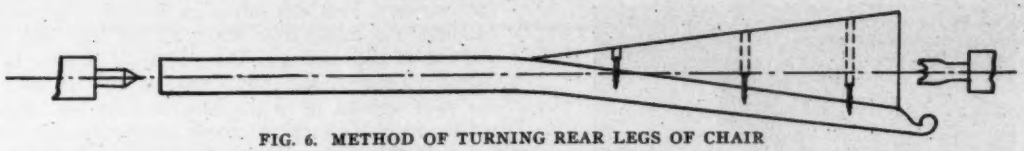


FIG. 6. METHOD OF TURNING REAR LEGS OF CHAIR

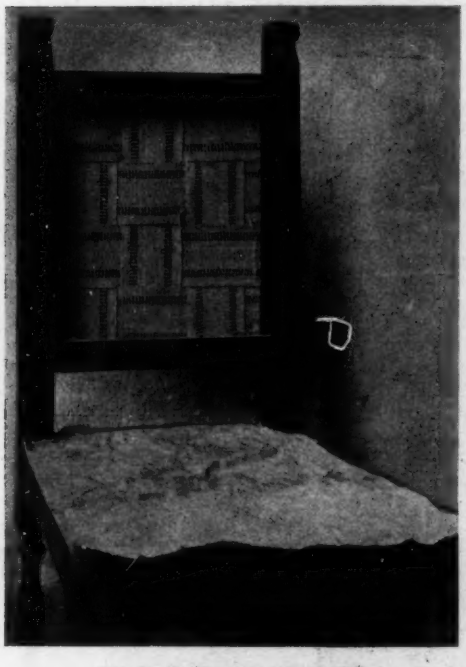


FIG. 7. WEBBING IN PLACE

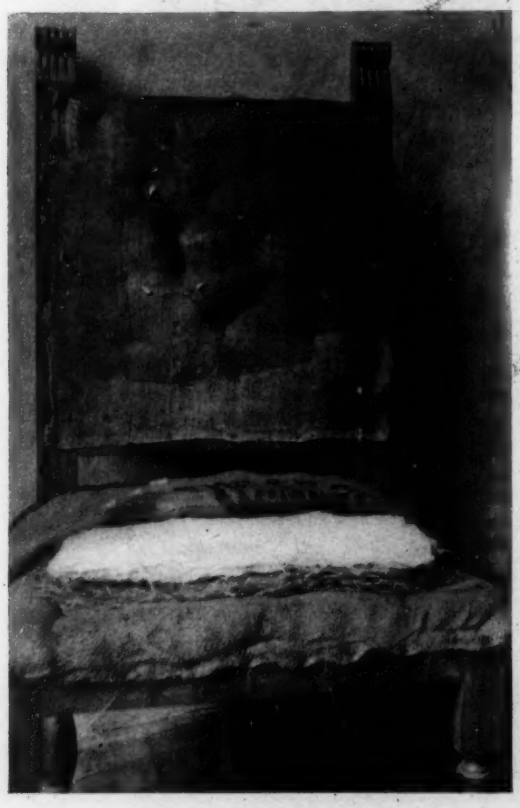
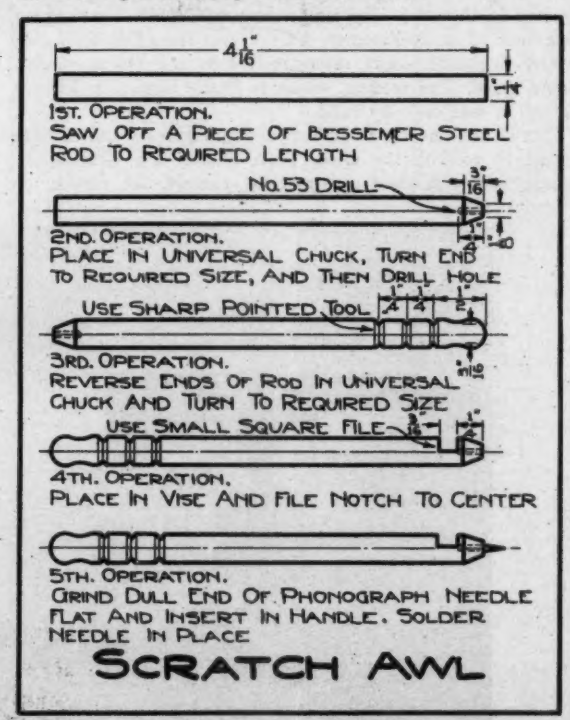


FIG. 9. PADDING THE SEAT

Figure 4 shows the chair with four stretchers, but at the last moment it was decided to leave out the front and rear stretchers and place only one stretcher in the middle instead, as is shown in Figure 5. It was thought that the front stretcher might be in the way when a person wanted to draw a chair up to the table.

FIG. 8. SEWING AND TACKING ON THE HARD EDGE

The important part of the upholstery is to stretch the webbing well, sew the hard corners carefully, and draw it down over the sharp edge of the chair. The materials needed for the upholstering are recorded on the drawing, and the various steps in the process are shown in Figures 7, 8, and 9. The chairs may be covered either with real leather or imitation leather. There are a great many varieties of the latter kind on the market, and they are both durable and beautiful, besides being much cheaper than real leather.


4 1/16"
1ST. OPERATION.
SAW OFF A PIECE OF BESSEMER STEEL ROD TO REQUIRED LENGTH
No. 53 DRILL
3/16"
2ND. OPERATION.
PLACE IN UNIVERSAL CHUCK, TURN END TO REQUIRED SIZE, AND THEN DRILL HOLE
USE SHARP POINTED TOOL
1/4
1/4
1/2
3RD. OPERATION.
REVERSE ENDS OF ROD IN UNIVERSAL CHUCK AND TURN TO REQUIRED SIZE
USE SMALL SQUARE FILE
1"
4TH. OPERATION.
PLACE IN VISE AND FILE NOTCH TO CENTER
5TH. OPERATION.
GRIND DULL END OF PHONOGRAPH NEEDLE FLAT AND INSERT IN HANDLE. SOLDER NEEDLE IN PLACE
SCRATCH AWL

INSTRUCTION SHEET FOR THE MACHINE SHOP, DESIGNED BY JESNER SHOLANDER, CHINO HIGH SCHOOL, CHINO, CALIFORNIA

Scuffling

Scuffling in the shop is always dangerous.

The boy at the machine is attending strictly to business, yet he is in danger of serious injury as a result of the actions of the two boys who are fencing behind him.

Avoid endangering yourself and others by engaging in foolish play when you ought to be working.

Safety Series—Roy R. Van Duzee, West Allis, Wisconsin

© Industrial Arts and Vocational Education

Turning

The boy in the above picture is about to commence turning operations on an irregular-shaped piece of wood.

When work of this kind is performed, care should be taken to feed the tool into the work very slowly, otherwise the tool may be jerked into the work and then thrown violently outward, or the stock may be jerked from between the centers.

In either event, the operator may be seriously injured.

Safety Series—Roy R. Van Duzee, West Allis, Wisconsin

© Industrial Arts and Vocational Education

A TOY MALLARD DUCK

C. Anthony Van Kammen, Grand Rapids, Michigan

With the approach of the Christmas season the woodshop boys are desirous of making some toy that may be given to a brother or sister, or, possibly to some little one not in the immediate family. The problem introduced here was originally designed for the sixth grade, but it has found favor, as well, with many seventh-grade youngsters who were able to improve upon the original model by constructing the head so that it would turn. Both models are shown in Figure 1. The seventh-grade problem at A, is slightly larger than the one shown at B, and has a somewhat thicker body and neck. This was necessary in order to make the neck round where it joined the body, so that it might be turned without extending over the body. The head, neck, and body in this duck are more accurately modeled to represent the

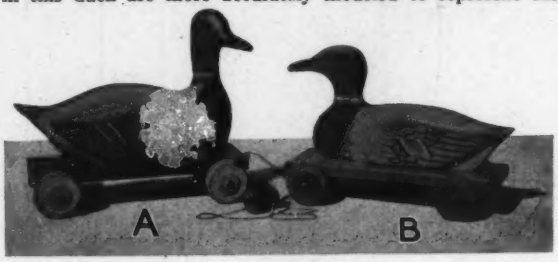


FIG. 1

real duck. Even the bill has the nostrils carved in with a veining tool. A mounted specimen of a drake mallard was borrowed from the Grand Rapids museum. The colorings and their locations were carefully studied and a decorative treatment was painted on the model with lacquers.

The working drawings of these models are shown in Figures 2 and 3. As both models are identical in construction, except for the more careful modeling and slotted dowel used on the movable head, the sixth-grade problem will be discussed. A brief note or two on the fabrication of the turning head will be given later. In the author's class the problem was begun in September and each boy was required to make a full-size working drawing. This may be dispensed with if the problem is started later in the semester, in order that ample time may be allowed to complete the problem before the Christmas vacation. The stock bills follow:

Bill of Material — Sixth Grade

1 pc.	⅞ x 2½ x 4	Head
1 pc.	⅞ x 2½ x 9	Body
2 pc.	3/16 x 2 x 5¾	Wings
1 pc.	5/16 x 3 x 9	Platform
2 pc.	½ x ½ x 3	Axles
1 pc.	¾ x 1¾ x 5	Wheels

Bill of Material — Seventh Grade

1 pc.	1⅛ x 2⅞ x 3¾	Head
1 pc.	1¼ x 3⅜ x 9	Body
2 pc.	⅜ x 2⅜ x 5¾	Wings
1 pc.	½ x 3 x 9	Platform
2 pc.	½ x ½ x 3	Axles
1 pc.	1¾ x 1¾ x 5	Wheels

Gumwood or basswood may be used for stock, but gumwood is given a slight preference because it is a firmer, harder wood and will stand abuse a little better. The duck proper is constructed from two pieces, as is shown in the working drawing, Figure 2. The location of the holes are carefully laid out and the two pieces are doweled and glued together. When dry, the surfaces are planed smooth to remove all mill marks. A cut-out paper pattern, traced from the working drawing, is laid out on the stock and closely drawn around. With the wood held in the vise, the duck is cut to shape with a coping saw. Having finished the contour of the duck, the body and head are modeled slightly with a half-round file and sandpaper.

The stock for the wings is hand-planed on one side only to remove the mill marks. The pieces are then bradded together, smoothed sides out, and are cut to shape from a pattern, as was done for the body. While bradded together the outer edge of the wing is filed rounding from both sides. When completely shaped they should be well sanded. After separating the two wings, nail one in place on each side of the body.

The cart or carriage is made next. The stock for the base is cut very near finished size so that all the surfaces need be planed only enough to remove all mill marks. The same thing is true of the axle pieces, so they need be planed only lightly. As the pieces are already cut to length, nothing is done to the ends. Hold the axle, end up, in the vise and locate the center of each end. With a nail set, accurately punch the centers for boring the axle-screw holes. The holes, ¾ in. deep, may be bored either with a No. 3 gimlet bit or with a ⅛-in. twist drill held in a geared hand-drill chuck. It is very important that the holes be bored straight. The axles may be glued and nailed to the platform or they may be fastened with two flathead screws. The latter method allows for adjustment in case the hole on one end or the other is bored off center, up or down. A wedge-shaped piece of cardboard may be placed under the axle for compensation and may be moved in or out as necessary. In this way all four wheels may be made to touch the surface upon which the toy rests.

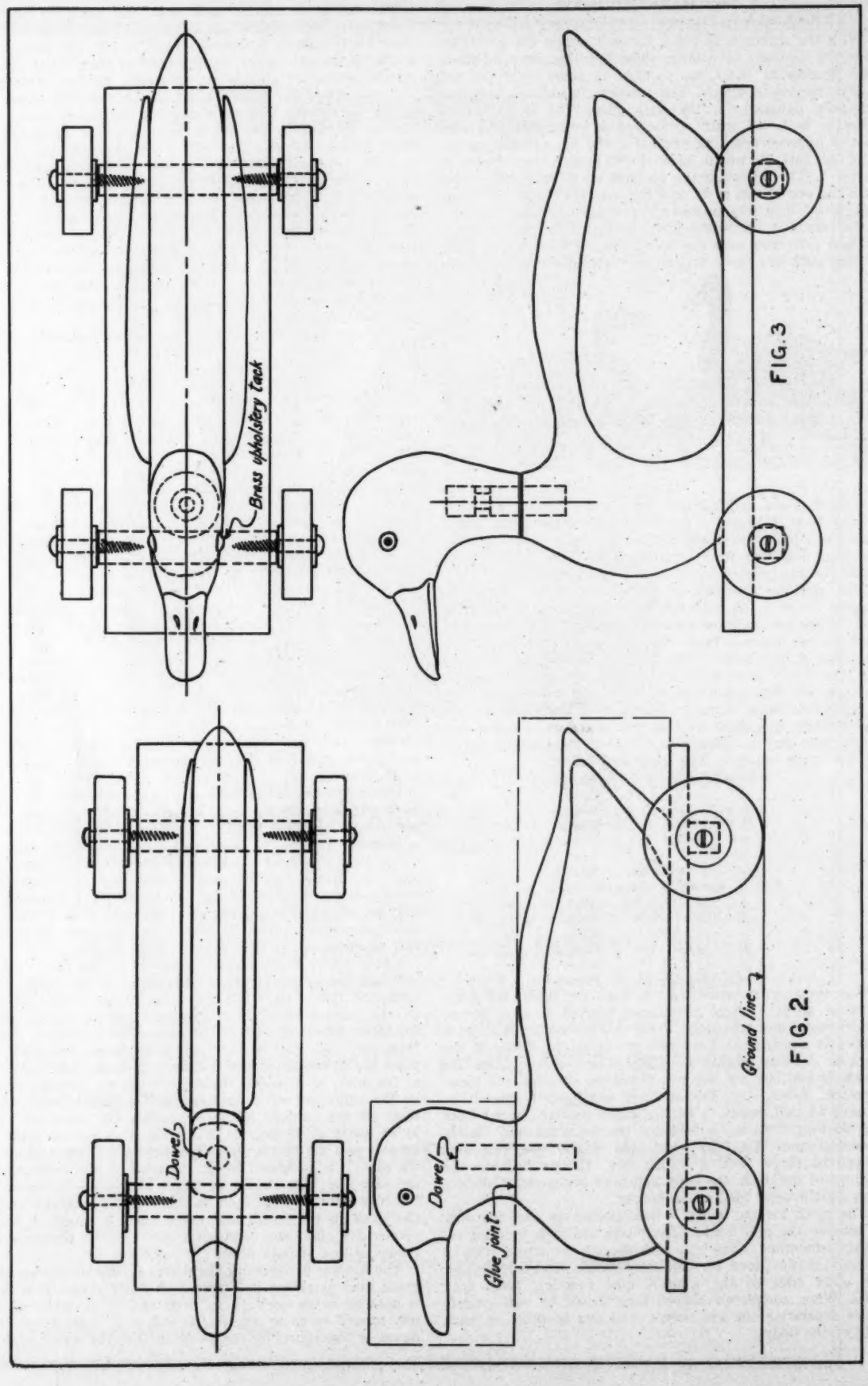
Two methods are used for constructing the wheels. The larger and older boys may be allowed to turn their wheels at the lathe. This was done in the author's class. A cylinder is made first. This is then cut into with a ¼-in. parting tool to a depth of 9/16 in. leaving a space of ½ in. between each cut or the thickness of the wheel. (See Fig. 4.) While in the lathe, sand the piece well to a smooth finish. Remove the stock from the lathe and saw the wheels apart with the miter saw. Sand the ends of the projecting hubs by holding the wheel in a horizontal position and rubbing the ends on a piece of sandpaper laid flat on the bench. The second or simplest type of wheel is made from a cylinder cut into disks ½ in. in thickness at the miter saw. The cylinders are turned to size by the older boys of the class. All pieces may be cut to the same thickness by the use of a stop block or rod set to allow only ½ in. of the stock to extend past the saw.

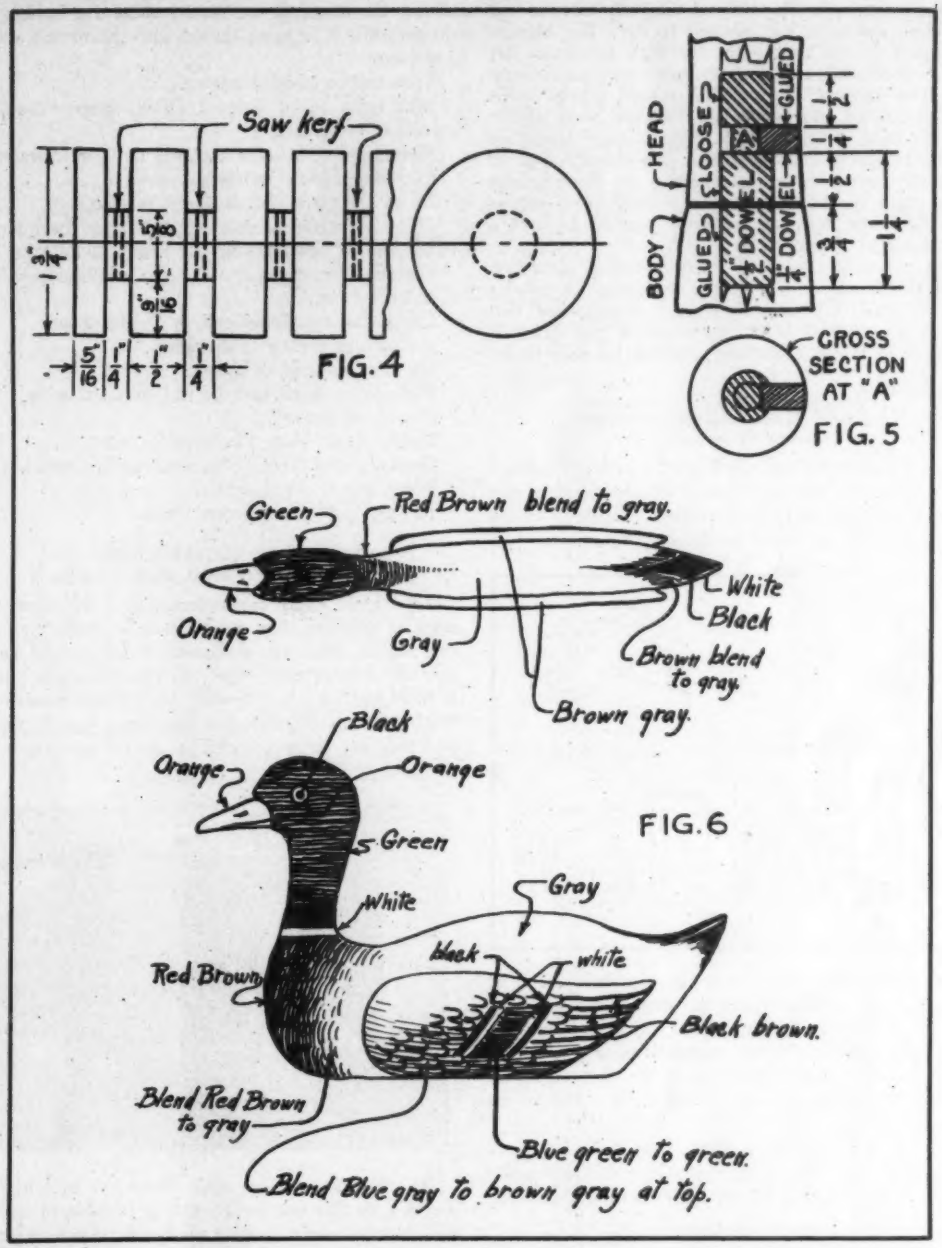
The most important part in the construction of the wheels is the locating and proper boring of the hole in the center of the hub. By the use of a knife and the centering device of a combination square, the centers are located on both sides of the wheel or hub ends. These centers are next accurately punched in with a fine nail set. Using a geared hand drill and a 3/16-in. twist drill, a hole is drilled in slightly more than halfway from each side of the wheel. Do not bore way through from one side. If the hole is correctly centered and drilled from each side, the axle-screw hole will be straight in the wheel.

Unlike the original problem on the seventh-grade duck, the body and head are separate. Before cutting to contour, each piece must have the dowel hole properly located and bored absolutely straight. If the dowel holes are at an angle in either piece, the head will not turn but will bind. A doweling jig, if available, may be used to advantage. If bored freehand, a slight variation of the hole in the piece for the head may be corrected by planing the joint edge so that the hole, or dowel projecting from it, will be in a relatively perpendicular position.

Check the contour outline when traced on the wood to see that the dowel comes in the center of the neck. It is suggested that a circle the exact size of the neck be drawn on the joint edge of both the body and headstock, using the same centers as that of the dowel. After checking everything carefully, cut the body and head to contour while the parts are doweled together. Finger-gauge a line on both sides of the duck, ¼ in. inside the edge all the way around, except on the under side of the bill and on the straight edge which rests on the carriage platform. Incline the band-saw table at an angle of 45 degrees. Place the duck on the table on its side and cut to the line. Pass the wood on the inside of the saw. If it is desired to cut the work on the outer side of the saw, the lines should be finger gauged ¼ in. inside on the edge instead of the face. In this way the band saw shapes the duck in the rough and much time is saved. A knife, spokeshave, file, and sandpaper, are used to complete the modeling to a smooth finish.

The method of fastening the movable head on the seventh-grade duck is shown in Figure 5. A ½-in. dowel 2 in. long is notched or recessed ⅛ in. deep and ¼ in. wide, all the way around so as to receive the end of a ¼-in. dowel. The dowel is then glued in the body so that the lower edge of


Brass upholstery tack
FIG. 3
Dowel
Dowel
Glue joint
Ground line
FIG. 2.



the notch is ½ in. above the neck joint. When dry, measure accurately to the center of the notch from the joint edge of the body. Lay off this same distance on the side of the neck of the duck from the joint edge. Bore a ¼-in. hole at this point to meet the ½-in. dowel hole. It is advisable to have a piece of ½-in. dowel rod stuck into the hole in the head while boring, so that the ¼-in. dowel bit will not split the wood inside the hole. Fit the parts carefully to see that the ¼-in. dowel pin holds the head tightly to the body. A little may be filed off the bottom edge of the ¼-in. dowel pin if it does not strike exactly in the notch. If the error in boring is such that the hole is high, the joint edge will have to be planed. To do this, hold the head securely in the vise so that the joint edge is in a plane parallel with the bench top and projecting above it the amount it is desired to plane off. With a smooth plane set very fine, the necessary stock can be removed by planing until the sole of the plane rests evenly on the bench top and vise face. It is best, of course, not to make any mistakes. When all is right, glue the ¼-in. dowel pin in place. Great care should be taken to see that no glue gets on the ½-in. dowel pin. Turning the head of the duck occasionally will prevent it from sticking.

Lacquers were used to color the ducks, before the final assembly of the parts. It is much easier to paint separate colors on different pieces when they are not in close proximity to each other. The necessary colors are, black, white, gray, red, marine blue, orange, jade green, and brown. A few cans of lacquer thinner may also be purchased for thinning the lacquer and cleaning the brushes. Any of the colors may be mixed to produce other hues as needed. Before painting it will be necessary to mix two special colors in some small receptacle that can be covered. These are to be used on the wings which are lacquered first. Make a blue-gray from gray, blue, and a little brown. The second mixed hue is a brown-gray made from gray, brown, and a little blue. Apply the blue-gray to the lower part of the wing and the brown-gray to the upper portion and blend the two similar to the shaded portion on the wing in Figure 6. The dark shading is the blue-gray. Flow the color on quite freely, using school water-color brushes. The rest of the colors on the duck are quite clearly defined. The blending of the red-brown breast color and the brown tail color on the gray body is done differently

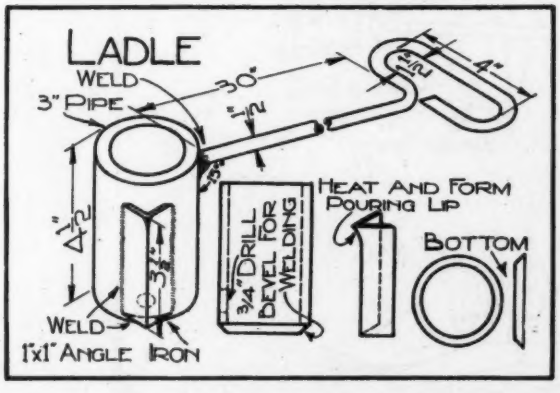
than the wing-color work. The gray of the body extends well under the other colors and is allowed to dry. The blended color is stippled on the gray body hue with an almost dry brush, and is feathered out allowing more gray to show at the limits. The carriage platform is painted orange while the axles are colored blue or green. For the body of the wheels, which have a turned hub, gray is used while the hubs may be lacquered blue or green. The simpler type of wheel is painted in one color, as there is no definite edge or ledge to guide the brush or form a limit for a second hue. The axle screw, however, may be painted to give a touch of contrast at the center.

When dry, assemble the parts. Fasten a small screw eye in the center at the front end of the platform. To this tie a few feet of cord for pulling the toy. It is suggested that a small spool be fastened to the loose end of the string as it gives the little fellow something definite to hold in his hand.

LADLE

R. B. Newhauser, Shorewood Public Schools, Milwaukee, Wisconsin

The piece of equipment described in this article, makes a very good addition to any metal-working shop and at the same time is very inexpensive to construct. Nearly all of the materials required can be found in the shop scrap box.



As the ordinary ladle pours from the top, care must be taken when pouring bearings that the slag and dross from the molten metal does not get into the bearing and spoil the job. In the ladle shown here, the metal is poured from the bottom, thus insuring clean metal and at the same time the dross and slag remaining on top, prevents the metal at the bottom from oxidizing.

The parts are built up by welding, care being taken to secure tight joints. Besides being useful for melting babbit and lead, the ladle can also be used for melting aluminum.

SCREW DRIVER

E. O. Schneider, High School, Stoughton, Wisconsin

The screw driver described herewith is just the thing for the car, radio, or home and is a good project for the high-school machine shop. Four operations are involved: Milling, knurling, taper turning, and forging. The hollow at the end allows the finger to be placed there for holding the screw driver while it is being turned with the thumb and finger.

Procedure

Turn end to ¾-in. diameter.

Mill eight ⅛-in. flutes 1/16 in. deep — use No. 5 gear cutter or ⅛-in. mill.

Reverse piece in lathe and turn to ½-in. diameter.

Cut the 3/16-in. radius as shown.

Knurl the piece that is ½ in. in diameter.

Offset tailstock ⅜ in. and cut taper, beginning 5/16 in. from the end and reducing the length of knurling to ½ in.

The shoulder at the end of taper and beginning of knurling is to be 1/32 in.

Check and cut fluted end to 1⅛-in. length.

Hollow out end to ¼-in. radius.

Chamfer the end as shown.

Reverse in chuck and cut end to ⅛-in. wide.

Round off corners.

Drill 7/64-in. hole, 1 in. deep in end.

Heat end and drive ⅛-in. drill rod to bottom.

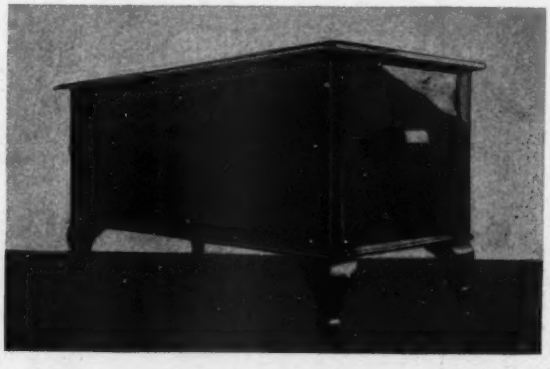
Forge end of screw driver.

File and polish with emery cloth.

A CEDAR CHEST

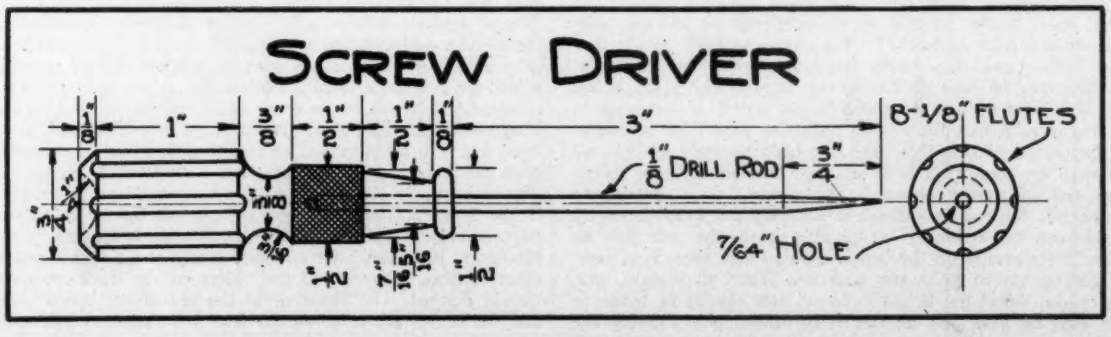
Harry W. Kroll, Buhl, Minnesota

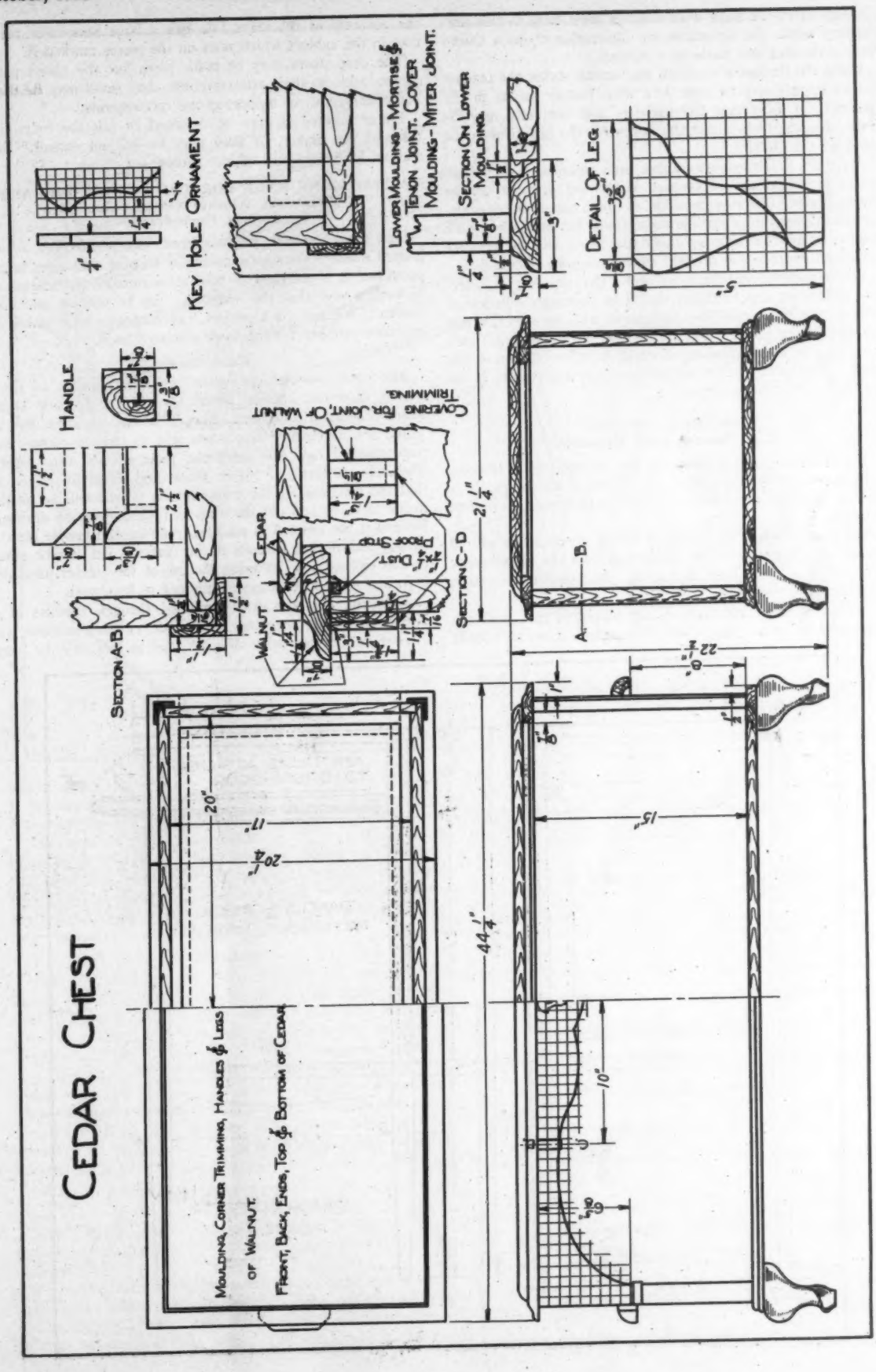
To a great many instructors, the cedar chest, as a wood-working problem, has depreciated in value, yet considering this project from the standpoint of commercial value, utility, and the number and variety of processes which it embraces, it rates high as a worth-while job for the woodworking shop. With a few modifications, it may serve equally well in a shop which is not equipped with all of the modern woodworking equipment.



In organizing a shop class where one half of the class is working on this one problem, it is possible to have a part of the material made up on a production basis. Where only one or two chests are to be made, two students may be allowed to work together on the project.

The first question usually asked is, "What kind of chest shall I make?" At this point, the student should be led to study various styles of furniture, including period furniture.




CEDAR CHEST
KEY HOLE ORNAMENT
LOWER MOULDING - MORTISE & TENON JOINT. COVER MOULDING - MITER JOINT.
SECTION ON LOWER MOULDING.
DETAIL OF LEG.
HANDLE
COVERING FOR JOINT, OF WALNUT TRIMMING.
CEDAR
PROOF STRIP
DUST
WALNUT
SECTION A-B
SECTION C-D
MOULDING, CORNER TRIMMING, HANDLES & LEGS OF WALNUT.
FRONT, BACK, ENDS, TOP & BOTTOM OF CEDAR.
20"
17"
20¼"
15"
22½"
21¼"
44¼"
10"

Catalogs from furniture dealers are a great help in this preliminary work. The accompanying illustration shows a Queen Anne style that was made by a student.

While the student is studying the various styles, the teacher has an opportunity to show him what beauty means in the designing of furniture. Comparisons and contrasts may be made, in order to inculcate the desire for the beautiful in the mind of the student.

After the preliminary work has been completed, each individual or group should prepare a full-size drawing of the chosen design. This may be made on rough paper. Other drawings and designs may provide suggestions, but only when each student or group designs an individual piece, will the greatest value and appreciation of good construction be obtained.

Before commencing the actual work, the construction, selection of lumber, and finishing, should be thoroughly discussed. This is very important. Then commence with the selection and dressing of the lumber, and then follow with the actual construction. If a semiproduction basis is followed, rotate the work so that each student will get an equal opportunity in the use of the different machines.

SMOKER'S CABINET

C. C. Clapper, Buhl, Minnesota

The smoker's cabinet shown in the accompanying illustrations makes an ideal problem for advanced woodwork. It is built up throughout by means of mortise-and-tenon joints and paneling.

The cabinet when completed, is highly practical. It will be found to be very useful by the smoker, and the housekeeper will find it a great help in keeping the smoker's materials together.

The ashes and burnt matches are placed in the small ash trays attached to the drop doors. When these doors are closed, the contents of the trays fall into a large removable metal tray in the cabinet which rests on the pieces marked A.

The drop doors may be made plain but the raised panel shown, adds to their attractiveness. Any wood may be used, but oak, walnut, or mahogany are recommended.

Pieces marked B may be designed to suit the individual taste of the maker, or they may be left off entirely, thus making a straight-line cabinet throughout.

A MAGAZINE RACK FOR THE SCHOOL LIBRARY

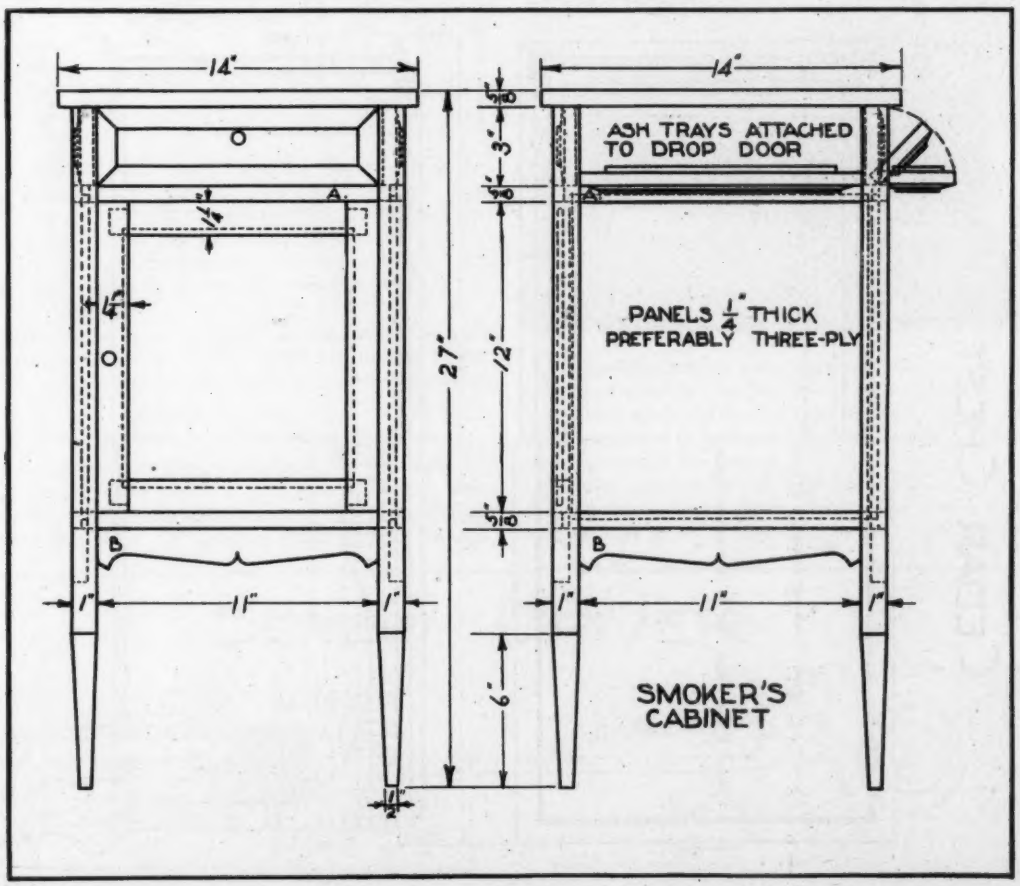
S. Wojnowski, Alliance College, Cambridge Springs, Pennsylvania

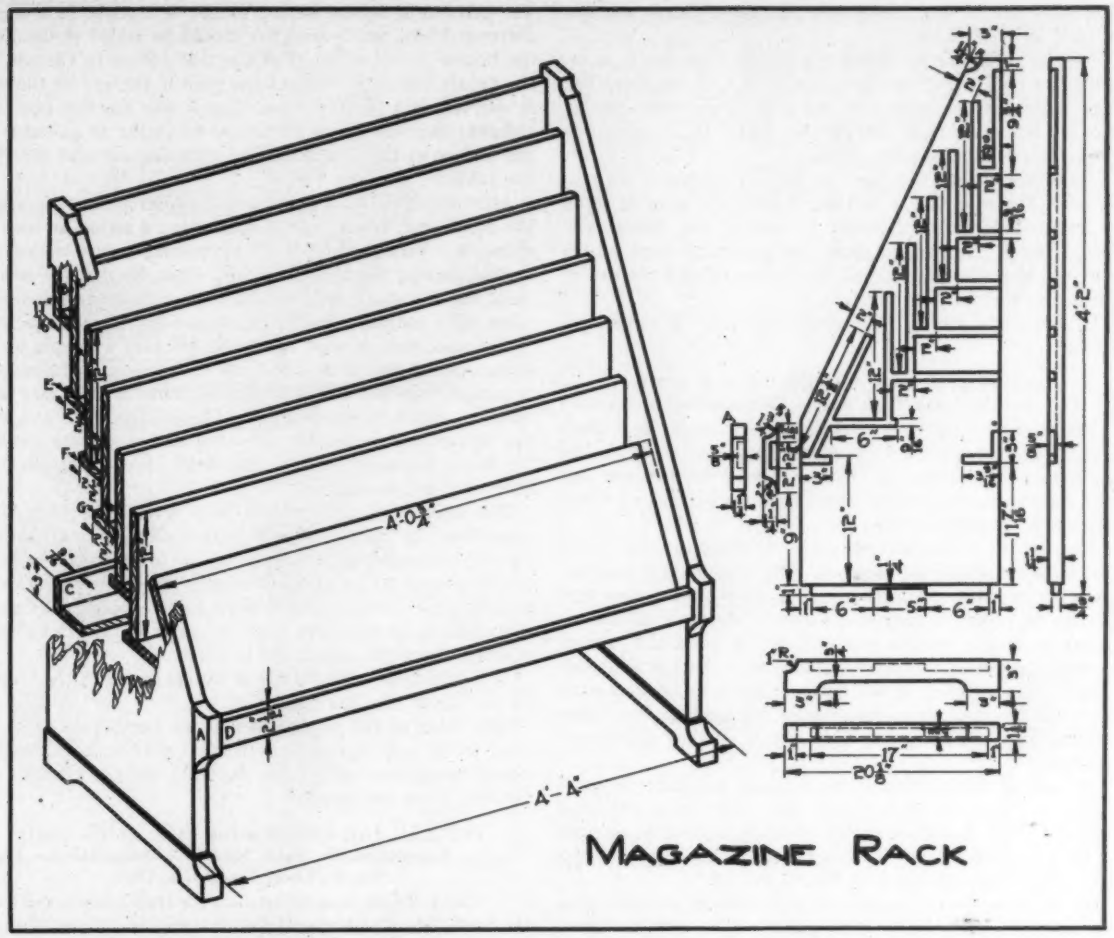
This magazine rack will find ready acceptance in a school library where a systematic means of keeping magazines is not provided. It is designed to hold approximately 40 magazines, in such a way that the magazines can be quickly and conveniently located. As a project, this magazine rack makes an excellent problem for the more advanced boys.

Construction

The constructional operations are quite similar to those that a carpenter finisher would take in constructing house stairs. The greater amount of work lies in the ends, two of which are necessary. The stock is a matter of choice, but well-seasoned oak will meet the requirements very nicely. The ends are made of 1¼-in. stock, and should be paired so that the mortises for the compartment boards will be on the inside of each. Lay out the ends as indicated in the drawing. Note that the offset A is omitted from the end proper for the simple reason that without it the diagonal cut can be made on the circular saw, allowing the use of the jointer, thus doing away with a considerable amount of handwork.

Mortising the ends was simplified through the use of a horizontal boring machine. The guide on the machine was altered to take care of wide work, and in this way the work





was moved up and down allowing successive holes to be bored. It is then an easy matter to trim to the lines with a chisel. Note that the mortises are all 9/16 in. wide.

The bases for the ends are made of 1½-in. stock, and are mortised to receive the corresponding tenons on the ends. The offset A is made of 1¼-in. stock, as shown in the drawing. The compartment boards are made of 9/16-in. stock, 4 ft. ¾ in. long. The widths, however, are determined by their respective mortises in the ends.

Assembly

Glue the bases to the ends. Number the compartment boards and check their tenons for fit in their respective mortises. Without doing this, some difficulty may arise in driving the ends in place. Place one end in a horizontal position on the floor with the mortises up. Drive the compartment boards into their respective places. Place the other end, with mortises down, over the compartment boards and drive them into place. Screw the members B, C, D, to the ends. Place the bottoms E, F, G, etc., in place. Glue on the offset A. This should cover the screws fastening D, in place. Finish to match the rest of the library furniture.

A SHOP KINK

V. C. Darby, Cedar Rapids, Iowa

Nearly every shop has instruction sheets, tables, and other printed or written data that is convenient to have continually at hand.

To protect such printed material against wear and to make it washable, coat it with clear lacquer, using one or two coats.

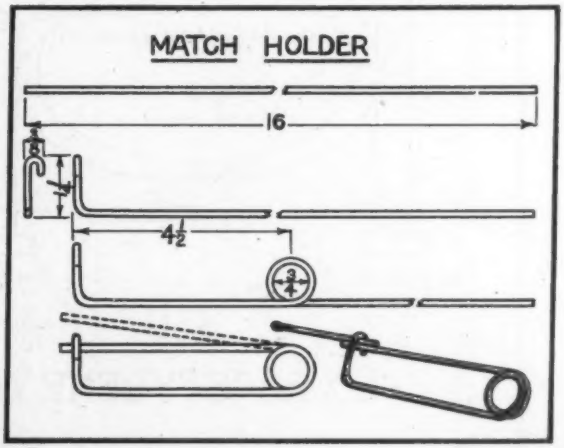
The lacquer is much better than shellac for this purpose. It dries quicker and dries with a dull finish which does not reflect light, thus making the material much easier to read. Then, too, the lacquer is more transparent than shellac, wears better, resists moisture better, and it does not crack or peel as shellac so frequently does.

MATCH HOLDER

C. F. Zaenglein, Public Schools, Circleville, Ohio

Editor's Note: This project was chosen, not because the object made is particularly valuable, but because it introduces bent-wire problems of which, no doubt, a great many may be devised. Teachers who have introduced problems of this kind into their courses are invited to submit them for publication.

We have used the project of the match holder described herewith, as a supplementary problem. It has proved to be an



interesting one for it is inexpensive and quickly made and can be used in every home.

The match holder in reality is a match saver for it is intended to hold burnt matches as well as new matches. The same match can be used over and over again when lighting one gas hot plate from another hot plate. It is quite convenient for lighting gas hot plates.

The material used is a piece of No. 12 galvanized wire 16 in. long. The wire should be twisted around a piece of wood or iron rod ¾ in. in diameter in forming the spring. The dotted line in the drawing shows the natural position of the match holder when completed. This gives enough tension on the match to hold it firmly.

We used this project as a souvenir at one of our annual exhibits.

OXYACETYLENE WELDED BOOK ENDS

R. F. Jennings, South High School, Minneapolis, Minnesota

Where there is need for a forging project requiring a small amount of oxyacetylene welding, the book ends shown in the accompanying drawing can be used. The writer has just had two classes of tenth-grade boys finish forty sets of these, finished in various colors.

The method of instruction used is the demonstration. Each part is first made before the class. This is frequently followed by a student demonstration by a member of the class who tries to duplicate the instructor's work while the rest look on.

As the student finishes each part of the book end, the instructor inspects it and gives a grade for it. That is, each boy receives a mark when he has finished four feet, another mark when the two arches are completed, another on the two forge-welded rings, and one mark each on steel welding and bronze welding.

In making the torch welds the boys are first taken in small groups and equipped with goggles while they watch a welding demonstration. A student is then assigned to make an attempt to do a satisfactory job while the rest of the students watch him. After that, all are ready to do the job.

It is advisable to remove all scale before attempting to bronze weld. This can be done either with a grinding wheel or a piece of emery cloth. It is important to have the weld well covered with bronze before adding enough for the fillet. The parts to be bronze welded should be brought to a bright cherry-red heat and bronze flux should be added at the time the bronze is melted on. The flux will adhere to the end of the bronze rod in a sufficient quantity if the end of the rod is warmed with the torch and dipped into the flux box. Insufficient flux will cause the bronze to gather in globules on the surface of the iron instead of spreading out and adhering like solder.

After the fillet is made, care must be exercised not to apply too much heat, for it will be found that a second or two in excess will burn the metals of low melting points out of the bronze, making the weld rough and weak. Neither the bronze weld nor the steel weld should require filing or smoothing other than sandpapering to remove scale before lacquering.

The steel weld is what is commonly called a "ripple weld" and requires very little filler rod. It consists of fusing the two edges together and allowing the flame to penetrate to a sufficient depth to give strength. The weld is given a ripple-like appearance by moving the torch with a circular motion. No flux is necessary to make this weld. Three-sixteenths inch steel filler rod is used.

The book ends are finished with crackle lacquer. After smoothing the iron work with emery cloth or sandpaper a coat of bright-colored brushing lacquer is applied. When this is dry, a second coat of black crackle lacquer is put on with a hand spray. As this dries it pulls apart exposing the lighter undercoat in an attractive way, the width of the cracks being greatest where the coat is the heaviest.

It is advisable to glue strips of flannel or felt to the bottom of the ⅛ by 1-in. pieces.

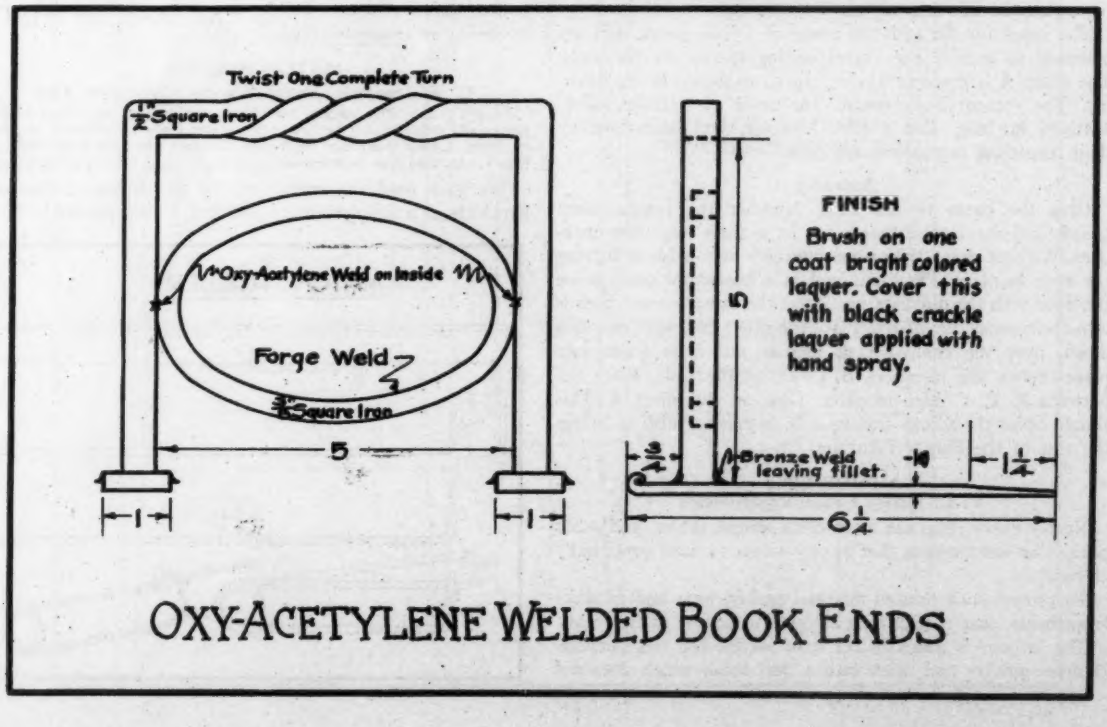
The value of this project lies in the number of processes used in its construction and the fact that each of these is simple enough so that boys in the ninth and tenth grades can perform them successfully.

TYPICAL JOB SHEET FOR THE AUTO SHOP

Assembling the Ford Model T Transmission

Ray F. Kuns, Cincinnati, Ohio

1. Check the running fit between the transmission shaft and the brake-drum bushings. If the clearance is .005 in. or more, press out the old bushings on the arbor press and press in new ones.



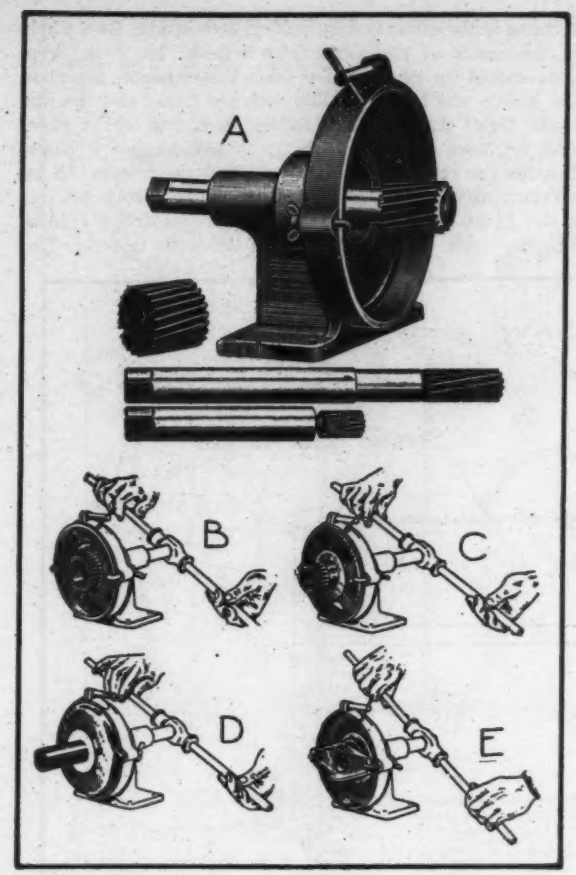


FIG. 1

2. Likewise, check the clearance between the brake-drum shaft and the bushings in the slow-speed drum. If this is more than .005 in. press out the old and press in new bushings.

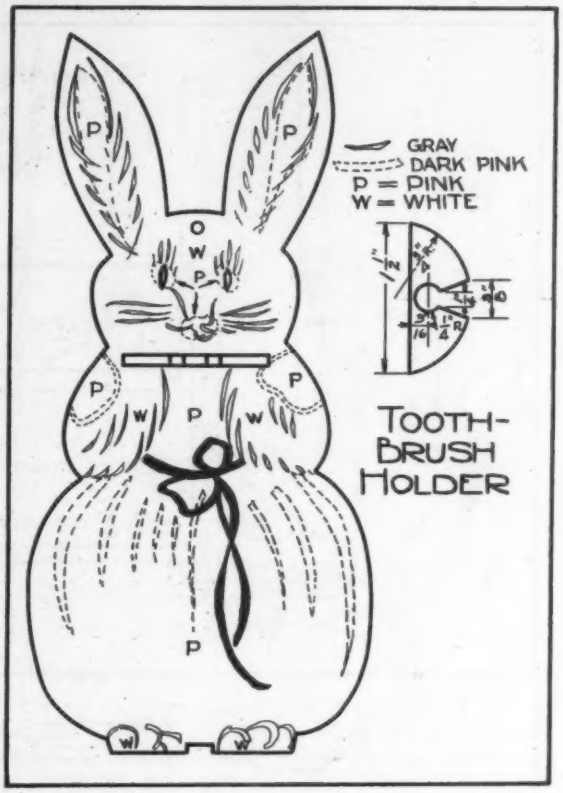
3. Finally check clearance between the bushing in the reverse drum and the shaft of the slow-speed drum. If this clearance is more than .005 in. a new drum should be pressed in after removing the old.

NOTE: New bushings in these parts must be reamed to a close running fit. There are a number of devices made for this work. They are designed to hold the parts securely while the reaming operation is performed, thus assuring the alignment of the parts. See A, Figure 1.

4. Clamp the brake drum in the reaming machine B, Figure 1, and use the reamer corresponding to the transmission shaft to ream the bushing. Test the fit on the shaft.

5. Clamp the slow-speed drum on the reaming jig or machine, C, Figure 1, and ream the bushing to a running fit, on the shaft of the brake drum.

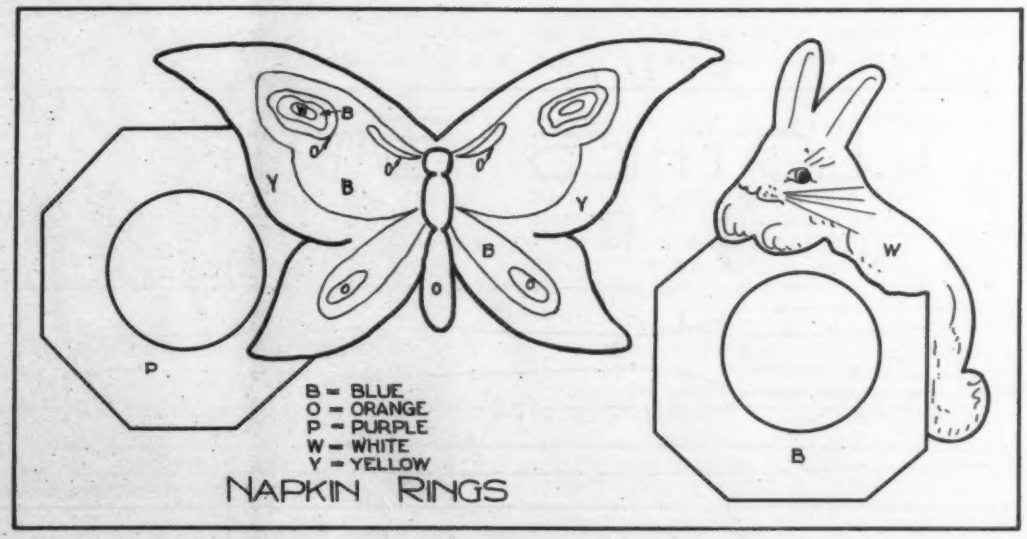
6. Ream the reverse-drum bushing D, Figure 1, using the reamer corresponding to the slow-speed-drum shaft. Test the fit of the parts.



TOOTHBRUSH HOLDER AND NAPKIN RINGS

Fred W. Megow, Thomas Williams Junior High School, Wyncote, Pennsylvania

In industrial-arts work, particularly in the lower grades, problems should show results in a short time, as well as direct correlation with other subjects. The author has found



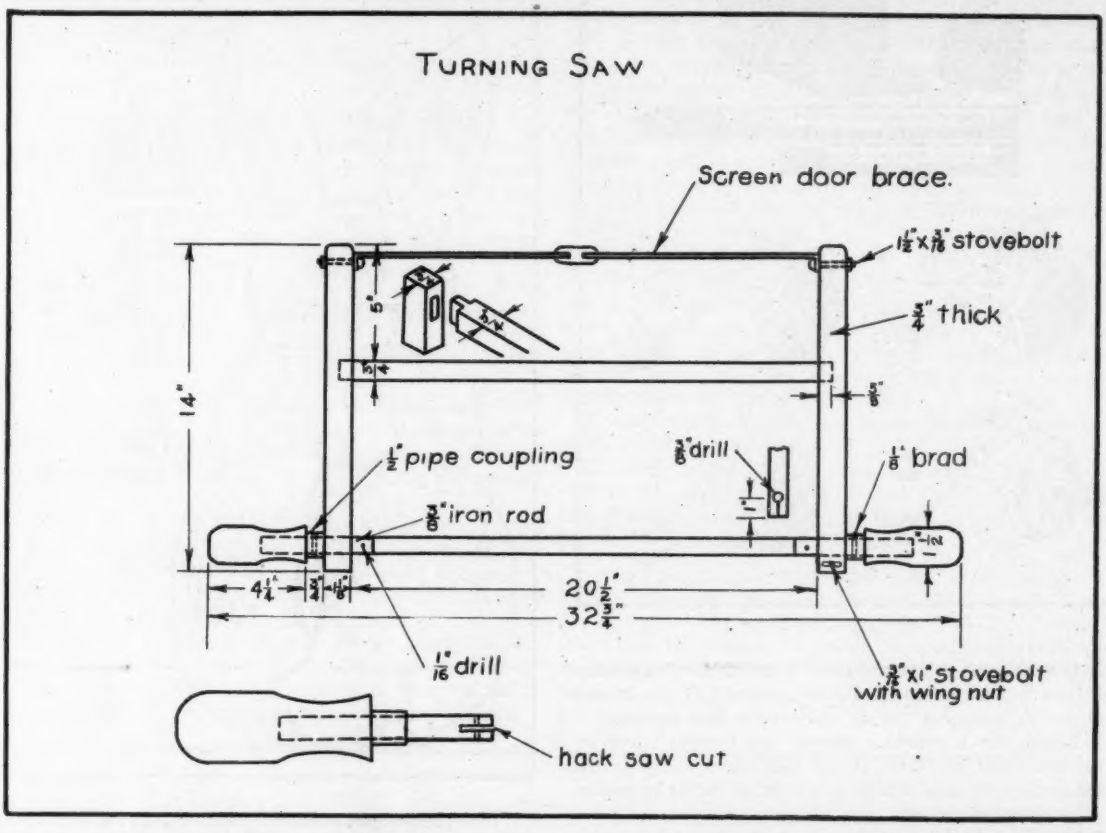
that small projects, such as those shown in this article, using three-ply ¼-in. wood can be made in a short time. When two or three of the pieces are finished, the boy should be allowed to take them to the class where he may paint them under the direction of his art teacher. Boys are usually very enthusiastic about these problems.

A TURNING-SAW FRAME

V. L. Hundleston, Arkadelphia, Arkansas

The turning saw is an indispensable tool in a shop where there are no band saws. The frame is so simple to make that it can be made in any ordinary shop and it makes a good project for the student. Then, too, it can be made from material picked up in the shop and at the ten-cent store. The dimensions given in the accompanying drawing are for a frame which holds an 18-in. blade of any width.

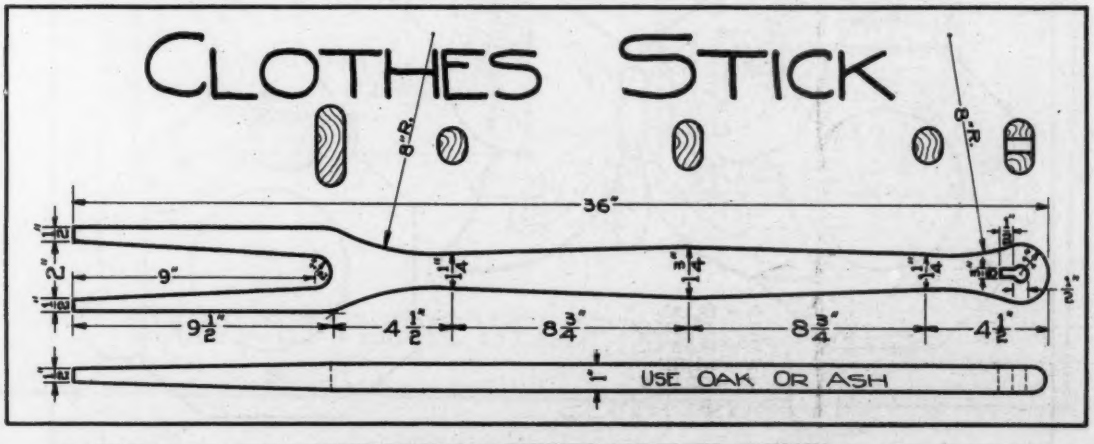
The handles are the only parts that are at all difficult to make. Turn the handles on the lathe and adjust the ferrules in place. To make these ferrules, saw a ½-in. pipe coupling in the center and use half on each handle. Bore a hole in the center of the handle with a 3/8-in. bit, 2 in. deep. Care should be taken to bore this hole straight, otherwise the handle will be out of line with the frame and the saw blade. Drive the 3/8-in. iron rod in place, and with a 1/8-in. drill bit, bore a hole through the handle so that it passes through the center of the iron rod and the ferrule. An 8d common nail may be used for a pin. With a hack saw cut a slot 5/8 in. deep in the end of the rod and drill a 1/16-in. hole to receive the pin which holds the blade in place. The frame should be made of seasoned ash or hickory, preferably the latter, and the handles of any hard nonsplitting wood.



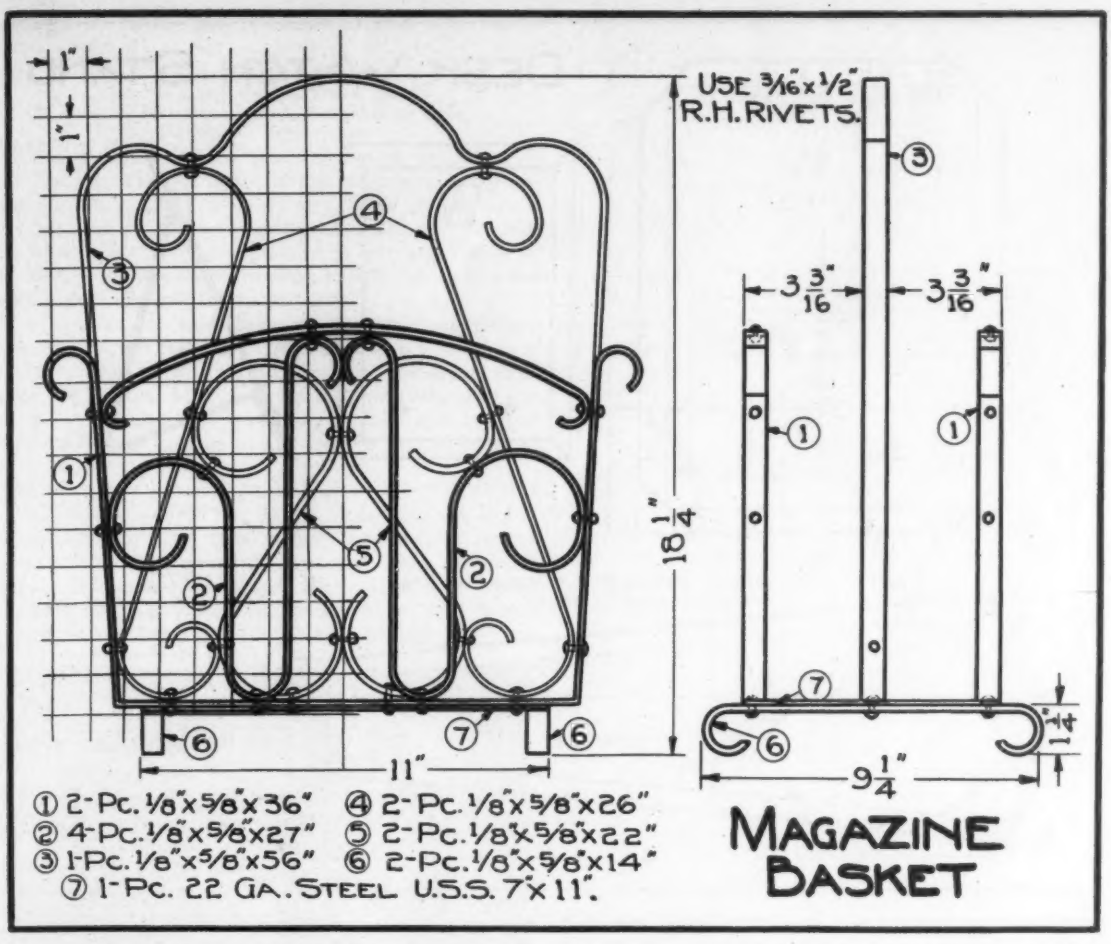
METAL MAGAZINE BASKET

H. O. Jaeger, Moline, Illinois

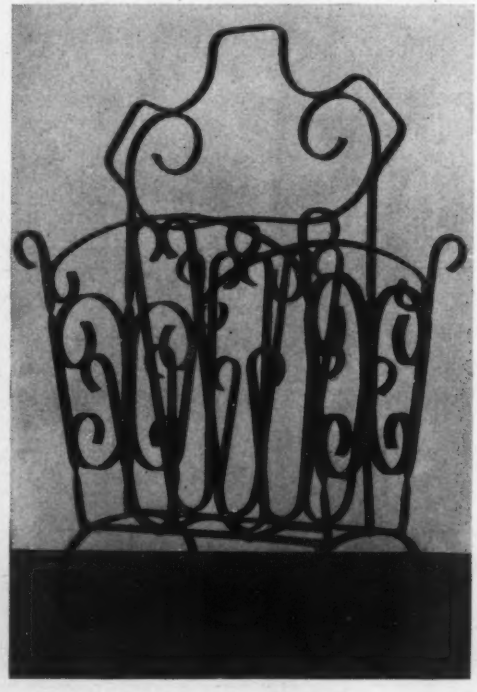
The magazine basket described herewith, makes a very attractive problem for the eighth-grade boy and can be made with little difficulty.



DESIGNED BY F. C. SCHMIDT, BOX ELDER, MONTANA



All of the pieces with the exception of the bottom are made of ⅛ by ⅝-in. band iron, using a piece of 22-gauge steel for the bottom.



Lay out the full-size drawing of each piece on a sheet of paper or on a flat board to serve as a pattern. Cut all pieces of metal to the required length and file all ends smooth. Find the center line on each piece and work from it when locating rivet holes or when bending the pieces.

In forming the small curves, get a piece of pipe or rod of the required size and fasten it in the vise. Heat the metal for small curves and bend it over the pipe. If a small curve is to be formed on both ends of the piece of metal be sure this is done before doing any other bending.

All large curves may be formed by opening the vise from two to three inches depending on the size of the curve, and placing the metal over the opening, strike it lightly with the peen of the hammer until the required curve has been formed.

After the metal has been formed, place all pieces used in one section on a bench so as to be sure all parts fit, then locate all rivet holes. All holes are to be drilled or punched to fit a 3/16-in. rivet.

Rivet all pieces in each section, then fasten the bottom and legs to the separate sections, and examine the whole job for rough edges. File these smooth if necessary.

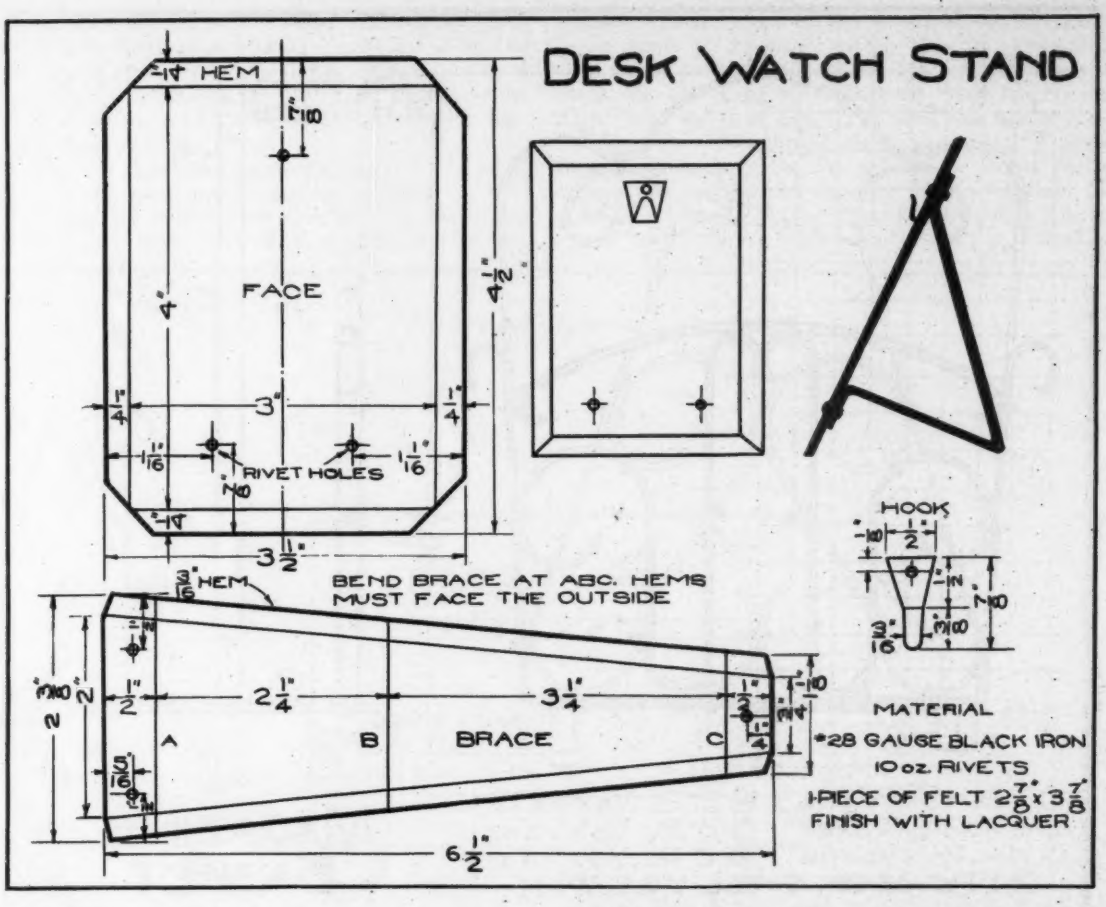
The magazine basket is then given three coats of lacquer. Between coats it is advisable to rub down with No. 0 steel wool or No. 00 sandpaper.

DESK WATCH STAND

George J. Schneider, State Teachers College, Oshkosh, Wisconsin

The project illustrated herewith, is a very simple, neat-looking, and useful device. The problem involves several operations all of which are very essential in sheet-metal work. It is a fine problem for the beginner.

The following operations are involved:



1. Laying out.
2. Cutting with tin snips.
3. Folding hems.
4. Bending.
5. Punching rivet holes.
6. Riveting.

It is very essential to follow the directions just as outlined. First of all, a piece of 3½ by 4½-in. No. 28 gauge black iron should be used, because lacquer or paint takes better on this iron than it does on IX bright tin. All laying out must be done first, both on the stand and on the brace. The hook which holds the watch is shaped out of a piece of the same stock, ⅞ by ⅞ in. in size. This hook and the brace are fastened at the top, with the same rivet. The hems on the face must not be folded too tightly so as to allow for a piece of felt to cover the face. The hems hold the felt in place. The brace is bent to fit the face after the hemming is completed.

Rivet both parts together, using 10-oz. rivets, placing the head on the front side of the face. Be careful not to close the hem when riveting. The project is then ready to be painted. After the paint has dried place the felt on the face.

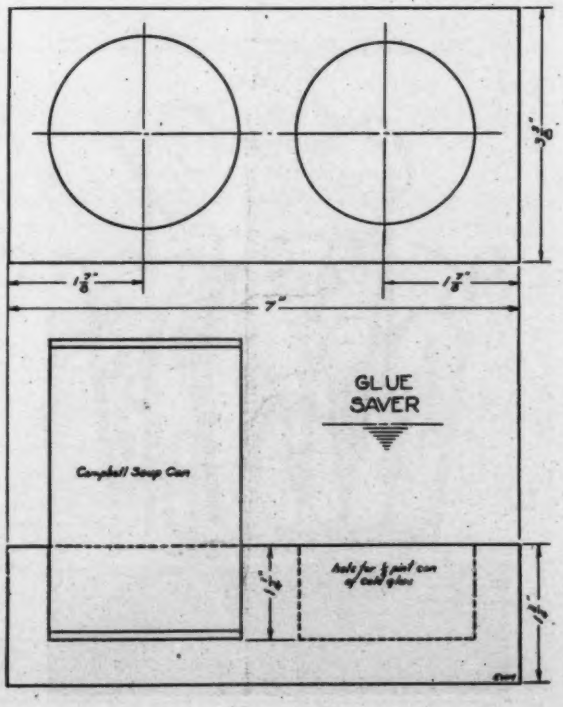
When completed this problem makes a very useful article.

A WOODSHOP ACCESSORY

E. W. Manzer, Bronxville, New York

The glue saver shown in the illustration has proved to be such a practical shop aid that it deserves to be passed along. In most shops the glue can is always covered with old, hard glue, and the brush is sometimes listed among the missing.

In the little shop accessory described in this article, the brush is always kept clean in the soup can that is set in the hole bored for it. Water, that must be changed occasionally, is kept in the can. The second hole in the block is bored for a ½-pint can of cold glue. When the can is empty, fresh glue is poured in this can thus keeping the new can of glue clean and free from hard glue. This glue saver does the trick and if it is always handy it eliminates the hunt for



the glue can. Casine glue, or cold-water glue, may also be used this way.

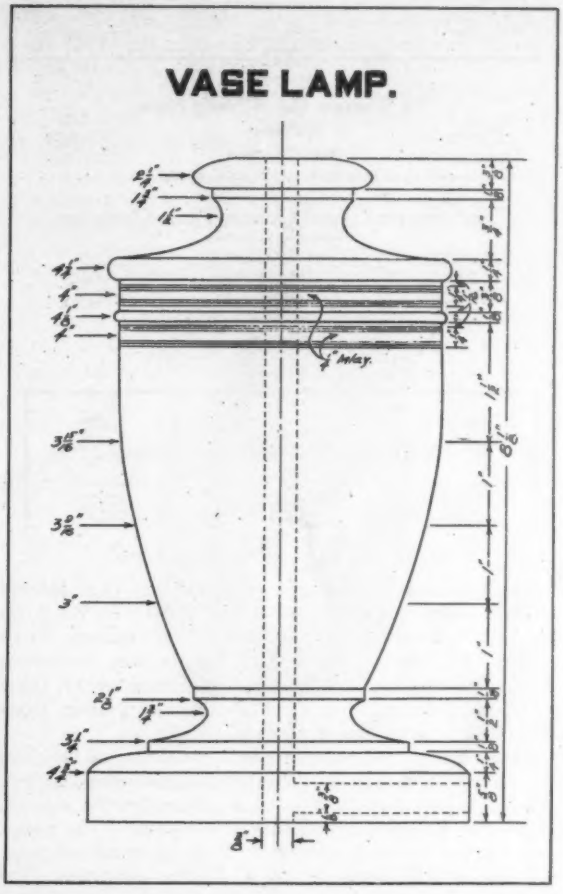
VASE LAMP
(Double Inlay with Centered Bead)

Paul N. Wenger, Supervisor of Manual Arts, Greenwich, Connecticut

At the present time, vase lamps of various designs are in great demand. The one shown in the accompanying illustrations provides a design which is very simple. As the double inlay is rather difficult, it should be attempted only by those who have had considerable practice in inlaying. The lamp also may be made without the inlay, and in this form it becomes a very simple faceplate problem.

The lamp may be made from one piece or from glued-up stock. Due to the fact that it is turned upon a small faceplate as a single unit, it provides an easy problem in lathe work. The graining of the wood should run parallel to the axis of the cylinder. Any good cabinet wood may be used. Cherry wood was used in making the one that is shown in the accompanying halftone.

The method of procedure is as follows: Select stock that is 5 in. thick, 5 in. wide, and 8¼ in. long. Plane one end of the piece and fasten it upon a small faceplate with screws that extend at least ½ in. into the wood. Turn cylindrical, using the dead center as a support. Bore a ⅜-in. hole through the center of the cylinder. Then bore a ⅜-in. hole through the base, so as to meet the center hole at an angle of 90 deg.



Next turn to the given diameter at the inlay section, allowing the material which forms the beads to remain. Glue the inlay in place, and allow to dry. Turn the cylinder to the desired shape, thoroughly sand the surface, and give it a natural finish. To protect the surface upon which the lamp will be set, cover the base with felt.

CHOOSE WINNERS IN TYPOGRAPHIC CONTEST FOR PRINTING APPRENTICES

A typographical contest, with the unique feature of including a photograph of the locked-up form, has been concluded by the Worcester Club of Printing House Craftsmen, of Worcester, Massachusetts. The contest was open to recognized apprentices in printing plants and students in printing schools throughout the United States and Canada.

The specifications were as follows:

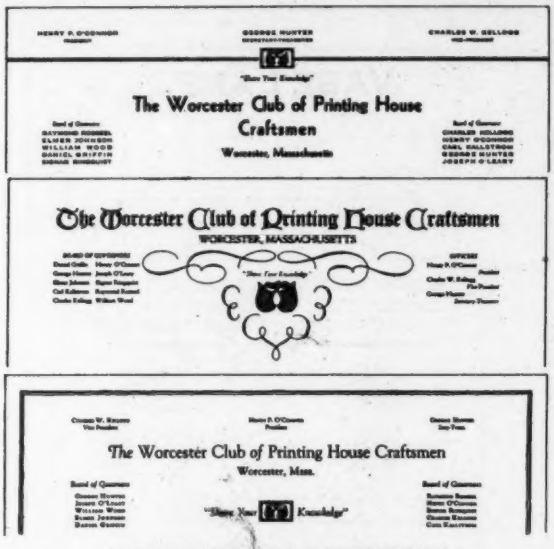
Set up a letterhead for the Worcester Club of Printing House Craftsmen. The copy must be as follows:

The Worcester Club of Printing House Craftsmen, Worcester, Massachusetts. The officers: Henry P. O'Connor, President; Charles W. Kellogg, Vice-President; George Hunter, Secretary-Treasurer. The Board of Governors: Daniel Griffin, George Hunter, Elmer Johnson, Carl Kallstrom, Charles Kellogg, Henry O'Connor, Joseph O'Leary, Eignar Ringquist, Raymond Rosseel, William Wood. Use the emblem and motto, "Share Your Knowledge."

The foregoing to be printed in one or more colors, on a 8½ by 11-in. sheet of suitable stock.

Each contestant may use his own judgment in the choice of type faces, ornamentation, and general arrangement.

Each contestant received a sample of the copy to be set up on a letterhead. The following standards were observed in judging the contest: (*a*) proper workmanship, as indicated by either a photograph or a good clear snapshot of form or forms; (*b*) fitness to purpose; (*c*) conformity to principles of design; (*d*) excellence of typographic display; and (*e*) suitability of stock.


The Worcester Club of Printing House Craftsmen
Worcester, Massachusetts
The Worcester Club of Printing House Craftsmen
WORCESTER, MASSACHUSETTS
The Worcester Club of Printing House Craftsmen
Worcester, Mass.

THE PRIZE-WINNING LETTERHEADS

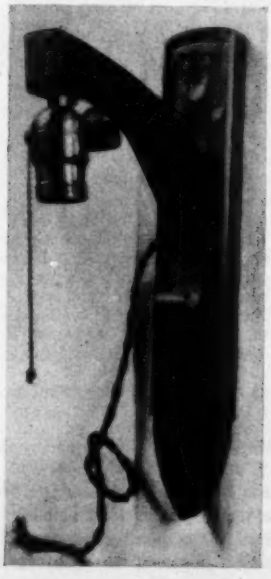
The five winners, in order of precedence are: First, Edward Hadack, Milwaukee Vocational School, Milwaukee, Wis.; second, J. W. Ladd, Carnegie Institute of Technology, Pittsburgh, Pa.; third, Edmund Korek, Milwaukee Vocational School, Milwaukee, Wis.; fourth, Charles Simonowsky, Lakeside Press, Chicago, Illinois; and fifth, Herbert Pearson, Lakeside Press Training School, Chicago, Illinois.

Eighty-five entries were received, practically all of them from students in schools where printing instruction is furnished. The following men acted as judges in the contest: Howard A. Campion, principal, Frank Wiggins Trade School, Los Angeles, California; Ralph K. Polk, supervisor of printing, Detroit, Michigan; Frank K. Phillips, American Type Founders Company, Jersey City, New Jersey; and Charles W. Kellogg, David Hale Fanning Trade School, Worcester, Massachusetts.

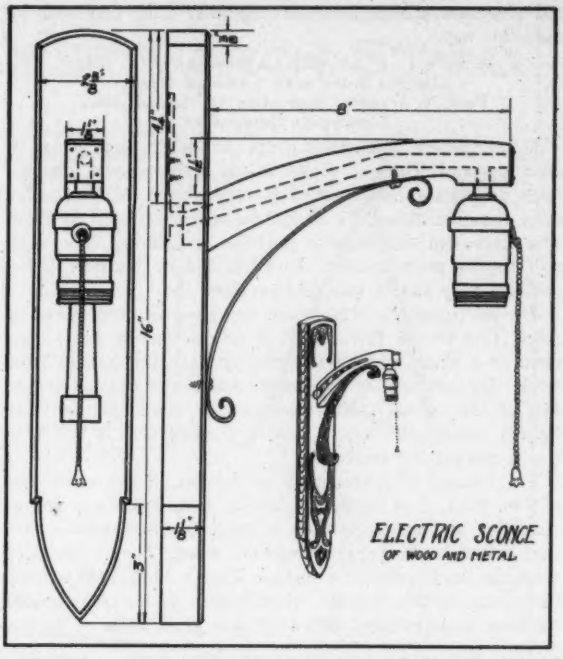
AN ELECTRICAL SCONCE

W. W. White, Huntington, Indiana

The craftsmanship of old produces welcome variations from the modern quantity production stock patterns. The sconce



illustrated herewith is an answer to the wish for something new and different in the woodworking shop. The wood used



is black cherry and it is carved in low relief and supplied with a hammered-copper bracket. The hole through the arm is bored from both ends in order to make the turn and the front hole is then covered by a piece of copper to match the bracket. The arm is mortised into the back piece and a metal hanger is set into the back to allow the sconce to rest snugly against the wall.

A pair of sconces similar to this one placed at the sides of a picture or mantel, make a fine appearance and attract much attention because of their difference from the designs ordinarily seen.

OLD ENGLISH OAK FINISH

927. Q.: I would like information on a suitable finish for old English oak furniture. — *R. N.*

A.: For old English oak furniture use the shellac mixing lacquer described in question 926. Apply this over the well-cleaned, but not filled, wood. Apply several coats, sanding between, and rubbing the last with crude oil and 2/0 steel wool to avoid the use of pumice stone which would tend to act as a filler. Wipe clean with fresh rags. The desired effect is a soft, deep-brown, thin finish, unfilled, which appears to be a part of the wood itself, with none of the appearance of varnish. — *Ralph G. Waring.*

SHELLAC ON FLOORS

928. Q.: Is it advisable to use shellac on a hardwood floor before applying varnish? — *E. R. C.*

A.: It is very inadvisable to apply shellac as an undercoating under varnish when used on floors. Experience has shown that there is very little adhesion between these two materials, specially when subjected to the abrasion of walking. It seems best therefore to use all shellac, or all varnish in any finishing system for floors. A new material, shellac mixing lacquer, has appeared which gives very fine service. Standard shellac of a 4-lb. stock, either white or orange, is reduced one third with denatured alcohol, and then slowly stirred *into* an equal quantity of shellac mixing lacquer. This will brush out well with a

wide Fitch brush; dries nicely, sands clean, oil rubs well if desired, and stands up well under wear and water. It can be easily renewed when slightly worn as around doors, etc. — *Ralph G. Waring.*

STAINING CEDAR CHESTS

929. Q.: I am in need of a formula for staining cedar chests. I had a formula which I have used but lost. Can you add the missing ingredient?

6/8 burnt sienna

2/8 raw sienna

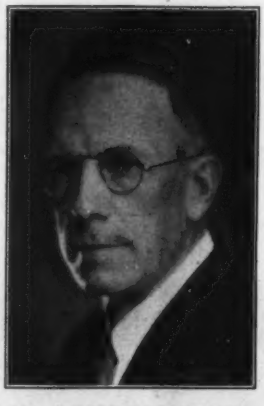
1 tablespoon japan drier to 1 pt. of stain. Use 2/3 boiled oil to 1/3 turpentine. A few drops of something else is needed. I can't remember. Can you help me, or give me another formula? — *G. O.*

A.: In regard to staining cedar chests, why anyone should want to stain them is beyond me. I service three plants manufacturing cedar chests, and a uniform red, to the elimination of the white sapwood, is the last thing on earth that is desired. In case you are using the so-called Washington Cedar it might be desirable to use a walnut stain, water soluble type, to soften the red a bit. Your formula is nothing more or less than a paint, and as such has no staining properties worth mentioning. Water stains are too easily obtained today to spend time with other decidedly inferior types. The most desirable finish for cedar chests is secured first by scraping and sanding the wood to a fine surface. Dust off and give a coat of four-hour varnish, let dry overnight, and resand. Recoat, and rub the last coat, of whatever number is desirable, with crude oil, FFF pumice stone, and felt pad.

Do not use shellac under the varnish, as test panels exposed to direct sunlight prove that much richer colors develop under varnish than under shellac, although the latter is used in many plants, for reasons of production. — *Ralph G. Waring.*

MR. BOYNTON ACCEPTS POSITION IN CONNECTICUT

Mr. Augustus S. Boynton, who has had considerable practical experience as mechanical engineer with the American



MR. AUGUSTUS S. BOYNTON
Director of the Division of Trade and Vocational Education, Hartford, Connecticut

Steel and Wire Co., Worcester, Massachusetts, the New York Edison Co., New York, Stone and Webster Engineering Corporation, Boston, General Electric Company, Lynn, Massachusetts, instructor in mechanical drafting at State Trade School, New Britain, Connecticut, director of State Trade School, Putnam, Connecticut, and director of the State Trade School, Meriden, Connecticut, will have ample opportunity to make use of this as director of vocational and trade education of the State of Connecticut.

Mr. Boynton is a graduate of the Massachusetts Institute of Technology, Boston, where he obtained his bachelor's degree in mechanical engineering.

MR. LANDERS PROMOTED

Frederick W. Landers, who has been in charge of the industrial-arts program of the Fredonia State Normal School for the past seven years, is now a member of the faculty of New York University, School of Education.

FREDERICK W. LANDERS
School of Education, New York University, New York, New York

The year previous to his appointment Mr. Landers studied at New York University, and after finishing there, was retained by Dr. Ralph E. Pickett, director of the vocational-education department, to be in charge of the shopwork at the University.

MR. FRYKLUND ACCEPTS NEW POSITION

Mr. Verne C. Fryklund, head of the department of industrial education at State Teachers College, Kearney, Nebraska, has accepted a position in the industrial-education department of the University of Minnesota.

Mr. Fryklund holds a diploma from the Stout Institute, Menomonie, Wisconsin. He obtained his bachelor's degree at the Colorado Teachers' College, and his master's degree at the University of Missouri. He has contributed frequently to magazines in his field and is co-author with Mr. R. W. Selvidge in *Principles of Trade and Industrial Teaching.*

He is a member of the Nebraska committee for "Course of Study for High-School Shopwork," of the Phi Delta Kappa, the N.E.A., Mississippi Valley Conference, the A.V.A., and other local and state organizations. He has held teaching positions in Detroit, Denver, Houston, and Colorado Teachers' College.

¶ Dr. Carl Colvin, formerly state supervisor of vocational education in Illinois, has been appointed to succeed Dr. George Freeman as director of the Haitian Service Technique d'Agriculture.

¶ Mr. Dean M. Schweickhard has assumed his duties as director of vocational education for the schools of Minneapolis, Minn. Mr. Schweickhard was formerly state supervisor of trade and industrial education.

¶ Mr. Charles B. Toynbee has been elected instructor in auto mechanics in the high school at Clairton, Pa.

¶ Mr. Robert S. Cooper has resigned from the board of vocational education at Kenosha, Wis. Mr. Cooper had completed fourteen years of service on the board.

¶ Mr. A. N. May, of Lexington, Ky., has been appointed supervisor of industrial education for the state vocational department.

ASSOCIATION & CONVENTION ACTIVITIES

INDUSTRIAL-ARTS AND AGRICULTURAL TEACHERS OF CALIFORNIA HOLD MEETING AT SAN JOSE

The trade teachers of California held a meeting on August 1 and 2 at the San Jose State College, San Jose, California, with more than 300 industrial-arts and agricultural teachers in attendance. Miss G. Laurine Broadwell acted as chairman. Dr. T. W. MacQuarrie, president of the college; Mr. J. A. McPhee, and Dr. Vierling Kersey, state superintendent, were the speakers.

A number of the leading school supply firms had exhibits of school supplies at the convention. The exhibit which was in charge of Mr. Judson Aspinwall, was in session from 9 a.m. to 5 p.m. Among the exhibitors were the following: Stanley Rule and Level Company, J. D. Wallace Company, South Bend Lathe Works, Black & Decker Mfg. Company, A. Lietz Company, Motor Tool Specialty Company, Joseph Dixon Crucible Company, McGraw-Hill Book Company, Eugene Dietzgen Company, and Bausch & Lomb Optical Company.

Pet projects and samples of summer-school shopwork were also exhibited. The toywork is a pet hobby of Mr. B. W. Spaulding, the originator of that work at the State College.

The department of industrial-arts education and teachers attending the summer session at the State Teachers College, held their second annual barbecue at Alum Park. More than 50 persons from various parts of the state were in attendance.

The California Vocational Association closed its annual meeting on August 2 with the election of officers and a reorganization of the association. At the business meeting, the name of the organization was changed to the California Vocational Federation. A constitution was adopted, with delegates from each of the eight divisions into which the federation is divided, forming an executive body for the transaction of all business. The next meeting will be held in Los Angeles. The officers elected were:

President, Mr. Robert Gilbert, Oakland; first vice-president, Mr. Morgan N. Smith, Glendale; second vice-president, Mr. J. E. Carpenter; secretary, Mr. W. L. Johnson, Napa; treasurer, Mr. W. H. Van Dyke, Petaluma; state editor, Mr. James A. Wood, Santa Barbara. — *V. A. Kottinger.*

INDUSTRIAL-ARTS ALUMNI ASSOCIATION FORMED AT OSHKOSH TEACHERS COLLEGE

The Industrial-Arts Alumni Association of Oshkosh Teachers College, Oshkosh, Wis., was formed by about 50 industrial alumni who were in attendance at the summer session. The following officers were elected: President, Earl W. Thrall, Beloit, and secretary, Albert F. Johnson, Beloit. Mr. E. J. Schmeichel, of Two Rivers, is chairman of the program committee whose duty is to outline the work of the organization.

GROUP ATTENDING ANNUAL BARBEQUE OF SAN JOSE STATE COLLEGE, SAN JOSE, CALIFORNIA

All graduates of the Oshkosh industrial course are automatically members of this association.

At 7:30 a.m., Friday morning of the State Teachers Convention to be held in November, a fifty-cent club breakfast will be served in the Dutch Room of the Boston Lunch Cafeteria, 619 Wisconsin Avenue, Milwaukee, Wis. This will be followed by a business meeting.

All alumni are urged to be present at this important meeting. Send in your reservations at once either to the president or to the secretary. — *Earl W. Thrall.*

WESTERN WASHINGTON ASSOCIATION HOLDS MEETING

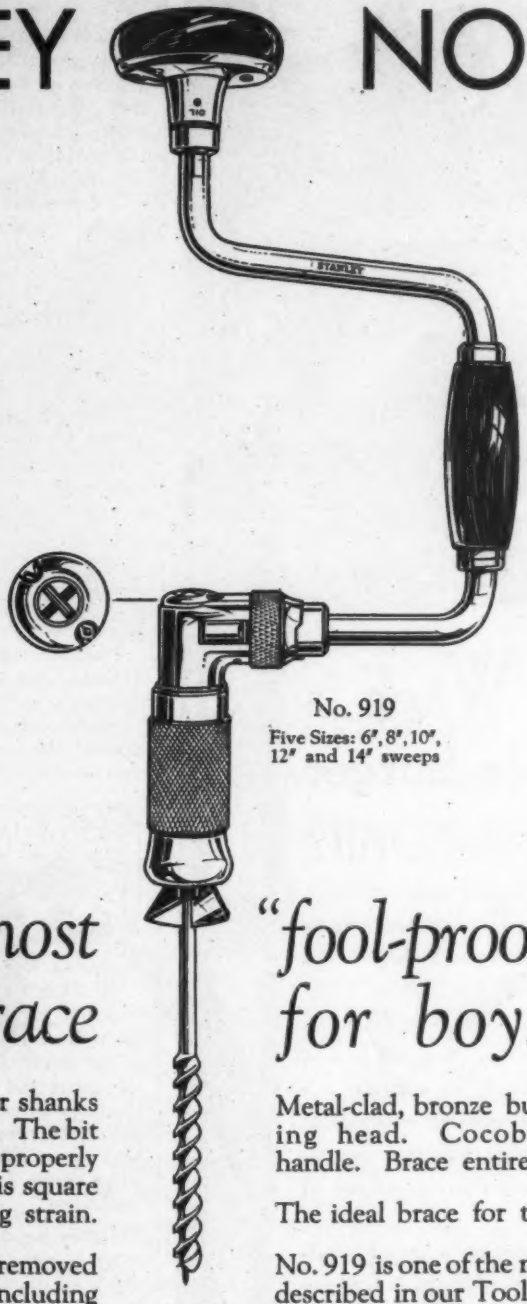
The Western Washington Association for Industrial Education met in Everett, Washington, for the annual spring meeting, May 10. Features on the program were talks on "State Courses of Study," by C. T. Miller, director industrial arts, Tacoma; "Aeronautics," by Arnold Drews, Everett; and "School-Shop Safety," by H. L. Hughes, editor *Supervisor,* Spokane.

Other features included an all-city industrial-arts exhibit at North Junior High School; a business meeting with L. B. Davenport, Everett, chairman; and a luncheon at the Elk's Club. This was followed by a trip to the local airport to witness an airplane model contest sponsored by the Everett Vocational Club and (Everett) Exchange Club. — *Charles M. Rice.*

(Continued on Page 26a)

A GROUP OF W. W. A. I. E. (WESTERN WASHINGTON ASSOCIATION FOR INDUSTRIAL EDUCATION) MEMBERS WHO ATTENDED THE AIRPLANE MODEL CONTEST HELD IN EVERETT, WASHINGTON, MAY 10, 1930, SPONSORED BY THE EVERETT VOCATIONAL CLUB AND THE LOCAL EXCHANGE CLUB

STANLEY NO. 919



No. 919
Five Sizes: 6", 8", 10", 12" and 14" sweeps

The most "fool-proof" Bit Brace for boys

Designed only for square taper shanks common on regular auger bits. The bit drops into a square socket that properly centers it in the chuck. This square socket also takes the driving strain.

No part of the brace can be removed easily. The entire chuck, including the jaws, is locked in place with a nut and cotter pin.

Metal-clad, bronze bushed, ball bearing head. Cocobolo head and handle. Brace entirely nickel plated.

The ideal brace for the school shop.

No. 919 is one of the many useful tools described in our Tool Catalog No. 34. Have you a copy with the special School Index?

THE STANLEY RULE & LEVEL PLANT
Educational Department
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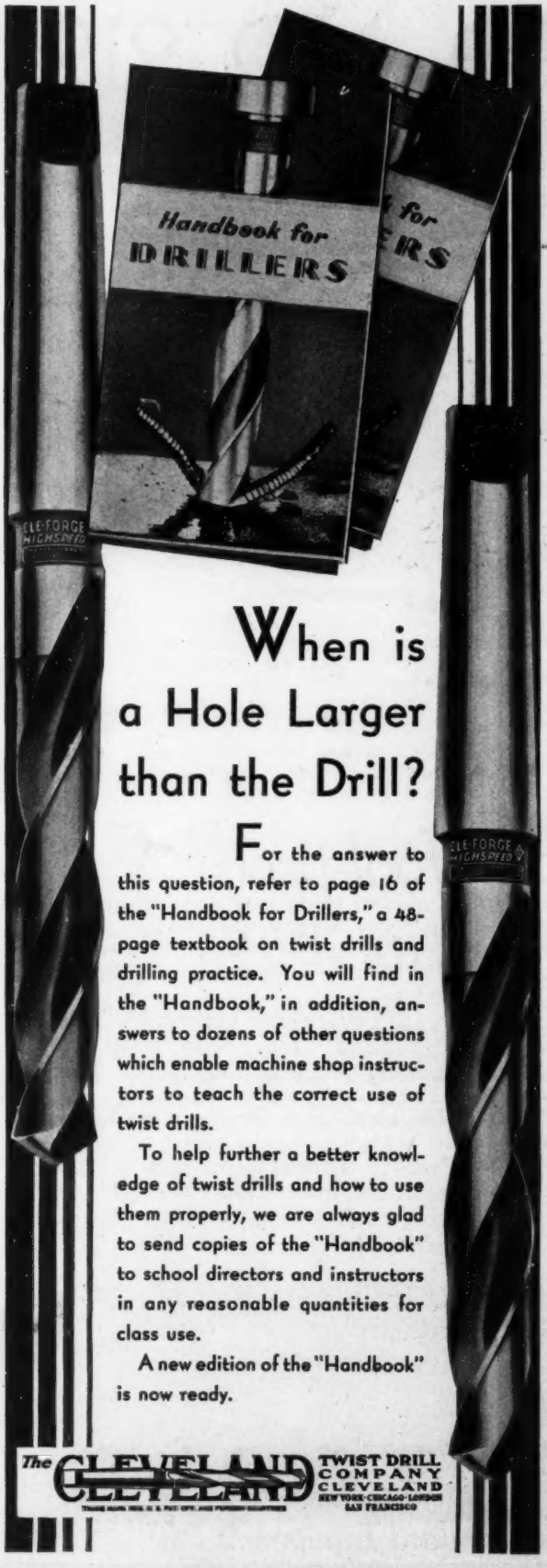
STANLEY TOOLS

Stanley Equipment is Standard Equipment


Handbook for
DRILLERS
When is a Hole Larger than the Drill?
For the answer to this question, refer to page 16 of the "Handbook for Drillers," a 48-page textbook on twist drills and drilling practice. You will find in the "Handbook," in addition, answers to dozens of other questions which enable machine shop instructors to teach the correct use of twist drills.
To help further a better knowledge of twist drills and how to use them properly, we are always glad to send copies of the "Handbook" to school directors and instructors in any reasonable quantities for class use.
A new edition of the "Handbook" is now ready.
The CLEVELAND TWIST DRILL COMPANY CLEVELAND

(Continued from Page 406)

AMERICAN VOCATIONAL ASSOCIATION

The general convention committee at Milwaukee, under the guidance of R. L. Cooley, has been exceedingly busy. Practically every detail of the convention has been arranged. The general sessions and the sectional meetings will be provided for adequately at the City Auditorium and the Milwaukee Vocational School.

The tentative preliminary program announcementts show that the convention will be very much worth while. The following speakers are listed on the part-time education program as it is developed at this time: G. P. Hambrecht, Dean Herman Schneider, Hon. Alfred E. Smith, Dr. R. L. Cooley, I. S. Noal, J. Ray Stine, and W. J. Regan.

The industrial-education program embraces a number of talks on the vocational training required in type industries. The industries represented are: Smelting and refining, coal mining, service station management, and restaurant management.

Then there will be talks on the school training for unskilled and semiskilled workers for junior technical positions in industry, for specialized operations, for apprenticeships, and on foremanship training.

The industrial-arts section lists the following speakers: R. W. Selvidge, F. E. Tustison, Lee Lamb, L. V. Newkirk, George K. Wells, Roy R. Van Duzee, G. F. Weber, William F. Hunter, E. E. Ericson, and Geo. W. Reavis.

Programs for Vocational Guidance, Vocational Teacher Training, and Printing Education are in process of being formulated at the present time.

The committee feels that the social features that are being planned will tempt many of the delegates to take up permanent residence in Milwaukee.

Instruction Manuals for Paper Hangers

By Claude H. Ewing and Arthur L. Clark. Unit No. I. Paper, 60 pages, 6 by 9, illustrated. Price, 75 cents. Published by McGraw-Hill Book Company, Inc., New York.

This interesting little manual will be found very useful in vocational and other classes on paper hanging. This unit embraces a total of 16 jobs which cover the essentials of paste table work and the hanging of simple patterns. The book is well illustrated and the directions are given in language simple enough to be helpful even when used for self-instruction.

Blueprint Reading

By Joseph Brahdy. Cloth, 194 pages, 6 by 9¼, illustrated. Price, $2. Published by McGraw-Hill Book Company, Inc., New York.

This revision of an older edition will be found an interesting addition to the books now existing on blue-print reading. The method of making blue prints and the different ways in which an object may be represented graphically are described. A large number of working drawings and white line on blue illustrations are included in the book. Numerous questions and problems make this text quite helpful in acquiring skill in the reading of working drawings.

American Housing

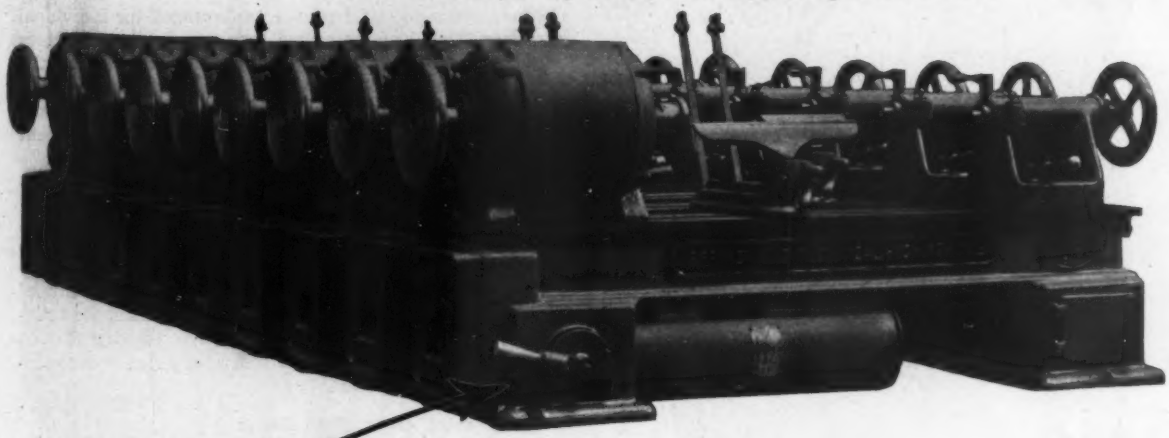
By Edith Louise Allen. Cloth, 216 pages, 5½ by 8, illustrated. Price, $2. Published by The Manual Arts Press, Peoria, Ill.

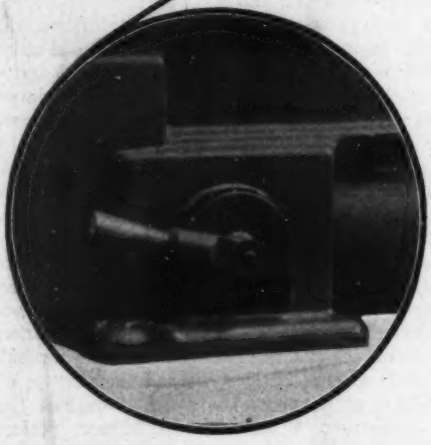
This is an interesting study of man's housing from earliest Colonial times to present-day practices. One chapter is

(Continued on Page 28a)

10 NEW TYPE "T-12" BENCH SPEED LATHES

For Springfield, Mass., High School





Safety Control is Regular Equipment on Yates-American Speed Lathes

The safety control, giving full overload and undervoltage protection, is furnished regular with Yates-American Speed Lathes, both with the "T-12" and No. 12. This control guards against starting at too high a speed or against accidental starting. This is an important point to recognize when considering new speed lathe installations.

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The Springfield, Mass., High School installs 10 Type "T-12" Speed Lathes. These machines are exact duplicates of the larger machine (without the legs), designed for bench mounting. They will do the same work, exactly as well, save floor space while allowing for individual installation. Write for the interesting particulars of this machine or any other in which you may be interested.

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K-25 Hollow Chisel Mortiser
S-14 Belt Sander
Y-16 16" Band Saw
Y-30 30" Band Saw
Y-36 36" Band Saw
N-4 Reversible Shaper
U-11 Horizontal Boring Machine
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S-10 Disc and Spindle Sander, and other machines for every need.

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These two books, used as supplementary references, will provide a short route to a "field" knowledge of approved trade practice. We will be pleased to send one copy of either or both for use in electrical classes—no charge.

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(Continued from Page 26a)

devoted to a study of furniture, and a table of dates giving the approximate date of the earliest appearance of inventions and usages that affected the home, is added. A fairly comprehensive bibliography also is given.

Social Science Lessons for Junior Workers

By Clarence P. Davey and James Cameron. Cloth, 94 pages, 5 by 7⅝. Price, 76 cents. Published by The Century Co., New York.

These lessons on social science are arranged for individual instruction. They have been used for some years at the Boys Vocational School of Detroit. The work is given under the headings: Industrial Relationships; Civil Relationships and Problems; and Economic Problems and Relationships. Each lesson gives a number of references for use by the student and a number of questions which he is to answer.

The Bureau of Home Economics

By Paul V. Betters. Cloth, 102 pages, 5¾ by 9. Price, $1.50. Published by The Brookings Institution, 26 Jackson Place, Washington, D. C.

This book is devoted to historic study of the Bureau of Home Economics in the Department of Agriculture, the activities that are covered, and the exposition of the organization required to make it function. A bibliography on home-economics subjects is appended.

Fundamentals of Architectural Design

By William W. Turner. Cloth, 11 by 15, 185 pages. Price, $6. Published by McGraw-Hill Book Company, New York, N. Y.

This book assumes that the student has a thorough understanding of the basic principles of architectural drafting and considerable skill in applying them. It is intended to carry him along to the more advanced stage of architectural drafting, through a study of shades and shading, perspective drawing, a thorough study of the classic orders, and the elementary principles of architectural rendering.

The book, according to the preface, is the outgrowth of ten years teaching, during which the author has had an opportunity of observing the effectiveness of his instruction in the subsequent experience and success of his students.

It is interesting to note that the author does not discuss the fundamental principles of architectural design in terms of balance, mass, and outline, etc., but that he very thoroughly and consistently brings to the student an appreciation of these more or less difficult and intangible qualities through the thorough study of the classic styles and the practice of the great architects of the past. The plates throughout the book are an inspiration in their careful balance, perfect technique, and interesting lettering. A glossary of architectural terms completes the work.

Fiber Furniture Weaving

By Emil Gandre. Cloth, 154 pages, 5⅞ by 8⅞, illustrated. Price, $1.75. Published by The Bruce Publishing Company, Milwaukee, Wis.

The author of this book has succeeded in writing an exceedingly interesting book on the subject of fiber furniture weaving. The book is well illustrated so that directions are easily followed by the student or the homeworker. While certain jobs have been selected to show the processes outlined in the book, nevertheless it will not be difficult to apply the processes to other pieces of furniture designed in a different manner from the ones shown.

Part IV of this book gives very interesting information about the materials which the furniture weaver uses. A total of 45 processes are thoroughly explained and then their application is shown on 15 different kinds of jobs.

The book will be found very helpful in the junior high school, the senior high school, and the part-time vocational school.

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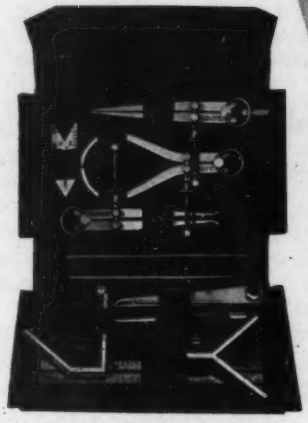

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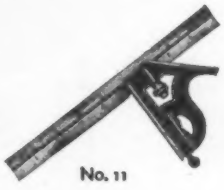

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(Continued from Page 28a)

Practical Mathematics

Part I, Arithmetic; Part II, Algebra.

By C. I. Palmer. Cloth 165 and 206 pages, 4⅜ by 6¾, illustrated. Price, $1.25 each. Published by McGraw-Hill Book Company, Inc., New York.

This well-known series of textbooks on mathematics is now appearing in its third edition. The books have been thoroughly revised and brought up-to-date, and the two volumes mentioned, cover the essentials of arithmetic and algebra.

Courses and Careers

By Ralph P. Gallagher. Cloth, 404 pages, 5½ by 8, illustrated. Price, $1.40. Published by Harper & Brothers Publishers, New York.

This book is designed for the junior and senior high school. It contains directions both for the teacher and for the pupil, and outlines in a very able manner the information that should be obtained in an educational and vocational-guidance course.

You Can Make It for Camp and Cottage

Paper, 47 pages. Price, 10 cents. Issued by the National Committee on Wood Utilization, U. S. Department of Commerce, Washington, D. C. This is the second of a series of bulletins prepared by the committee, which is devoted to the construction of useful articles from old wooden boxes and scrap lumber. It contains more than 100 plans and designs for articles from camp stools to fishing tackle, together with suggestions and working plans for each project. The booklet should be helpful to boys and girls who plan to build their own camp equipment.

Choosing a Vocation: Law, Medicine, etc.

A series of radio talks on choosing a vocation. Published by the University of the State of New York, Albany, N. Y. These pamphlets represent a series of talks on a number of professional vocations, which was arranged to bring to the young people of the state accurate information about these vocations from outstanding professional leaders. The rapid growth in the number of new vocations and the new demands of the older ones present a complex problem to youth. These pamphlets have been issued to make it easy for the student to choose wisely.

Alternating Currents for Technical Students

By Calvin C. Bishop. Cloth, 317 pages, 5½ by 7¾, illustrated. Price, $2. Published by D. Van Nostrand Company, Inc., New York.

This book, well illustrated with numerous diagrams, explains alternating currents in language that the ordinary student can understand. The student does not have to be proficient in higher mathematics to derive benefit from this text.

Electric Wiring

By Albert A. Schuhler. Cloth, 380 pages, 4¾ by 7⅜, illustrated. Price, $2.50. Published by McGraw-Hill Book Co., Inc., New York.

This book contains 305 different electrical jobs. It is well illustrated with simple diagrams and pictures. One or more questions that must be answered by the student, are part of each job.

Linoleum Block Printing

By Ernest W. Watson. Quarto, boards, 86 pages. Price, $3. Milton Bradley Company, Springfield, Mass.

This is not just another book on block printing. The author is both a master of block cutting and a competent teacher, and he brings together there a genuine teaching book, in which he also demonstrates his ability to apply block printing to a wide variety of typical problems. Examples from modern artists and complete illustrations of color blocks acquaint students with the interesting possibilities of this fascinating work.